

# COAL AGE

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## THE NEW YEAR

By FLOYD W. PARSONS

*"I'm mighty glad to see you, Miss Liberty, and I don't deny you are the grandest lady on earth; but if you ever want to see me again, you'll have to turn around and face the other way."*

Such was the comment of a soldier boy standing beside me on the deck of a steamer entering New York harbor the other day. The same thought was current in the minds of hundreds of other Americans returning from "over there."

If the war has done nothing else, it has caused several million Yankees to appreciate more properly this great land of freedom. Most of our soldiers will return home minus any desire to again cross the Atlantic. The horrors of this conflict in Europe have left an impression on human hearts that will not be effaced for generations. The boys will come back with a far deeper appreciation of law, order and justice. They will take good care that no elements of discontent in our population employ violence in their effort to realize radical aspirations.

Our returning soldiers know now how great is the waste and sorrow of war. They have learned that peace must be founded on high principles and be supported by great virtues; that deeds are silent, and that people who boast most generally fail most; that one affliction is better than a thousand exhortations; that it is easier to tear down than to build up; and that one may as well look for ground where no weed will thrive as for a human heart where no error will grow.

No benefits can ever justify war, but our losses and sacrifices have made the United States a nobler nation, a nation with an awakened conscience. The chief danger is that we may backslide. Nothing could be worse than for America to fail in her effort to champion the cause of oppressed peoples. The world would be set back beyond

redemption, and the last embers of hope would die in the breast of civilized humanity.

We start the New Year with problems that have never before confronted us. Thousands of soldiers are returning to find industrial employment at a moment when our National pursuit ceases to be the business of making war. At the same time our promises must be kept, and we are obligated to feed millions of mouths in Europe. Consequently, food may be dear and employment slack during the early days of our reconstruction era.

Our duty is plain. Each individual must resolve to serve and save as never before. The end of the struggle spells the beginning of greater sacrifices. During the days of war prosperity, the average American workman has not let go the bridle. In the coming months of business readjustment the things that will count are caution and patience. We must do head work before hand work, and not forget that the edge of the shovel and the point of the plow are close kin to the meal-bag.

We might as well try to improve the rainbow by adding another hue as to expect that the wheels of industry will move without the force of our daily labor. The law of supply and demand will still be on the job 24 hours each day. As in times past fortune will smile on the fellow who conserves his time, grins at bad luck, exercises patience and discretion, and keeps everlasting at it.

If there ever were a time for high resolves, it is right now, during these days of world convulsion. Let us stop theorizing and commence the New Year by settling on a course of old-fashioned, honest hustle, which alone has made America the grandest and the most prosperous land that lies under the sun.

# The Consolidation Coal Company

BY GEORGE W. HARRIS

Editorial Staff *Coal Age*

**F**IIFTEEN million tons of bituminous coal is a big annual shipment of fuel. The total estimated requirements of bituminous coal of the whole country for the current year is only about 42 times this amount. The only company exceeding a shipment of this magnitude and kind of coal—the Pittsburgh Coal Co.—loaded 18,709,926 tons for transportation in 1916, its year of highest production. The subsidiary companies of the United States Steel Corporation manufacturing beehive coke have mined an amount exceeding the Pittsburgh company's record, but they made the greater part of this tonnage into coke.

These achievements are cited principally to show the

land and Pennsylvania divisions of the Consolidation company. These small mines seem to increase the tonnage shipped, on first thought; but an analysis of the situation shows that less railroad coal is sent to market on account of the interference of these wagon mines.

The proposition is as follows: A small mine opens up and is given one car a day to load by the railroad company; if this car is loaded on time one car a day is allowed regularly to the mine—there is no demurrage in any event. Should the mine prove to have a capacity to load more cars, then they are supplied up to four in number daily. At this point it generally operates that greater tonnage is only secured by a siding or branch line being put in from the railroad, in which case the mine becomes a commercial shipping mine. Under this classification a railroad official rates the mine regularly as to its capacity to load coal, noting the various phases of its development and its equipment for handling coal from mine face to railroad car. Cars are distributed among the various operations along the line of the road, according to this annual rating.

Returning to the loading of coal by the wagon mines: Each mine receives a car a day and a time limit of two days is placed on its loading. Should it take two days to load this car, note is made of the fact on a list of such mines and the mine does not get another empty car until every other mine on the list is given one. In this extreme case at least



FIG. 1. STEEL TIPPLE UNDER CONSTRUCTION AT MINE NO. 87

importance of a concern aspiring to a 15 million annual tonnage. The Consolidation Coal Co., with mines in four states, produced about 10½ million tons of coal in 1915, its year of greatest output. During the first part of the present year, this company hoped to reach a tonnage somewhere near the capacity of its mines, but on account of shortage of railroad cars and labor, and lately the influenza epidemic in addition, its expectations will not be fulfilled—all these causes have contributed to a curtailment of production.

The burning question is one of lack of railroad cars, and this situation has been aggravated by the advent of many small mines. There was practically no such thing as wagon mines in the Fairmont region before the war; now there are over 100 such mines operating in this region alone—they cannot load rail coal direct. In the last three years 90 per cent. of the wagon mines in this territory started up; there are said to be none in eastern Kentucky, but there are quite a few in the Mary-

12 hours are saved on the part of the commercial mines; here cars placed in the morning are loaded and ready to be taken out not later than the next night. Furthermore, the large shipper is a simpler proposition for the railroad people; the cars to be handled are more concentrated, time is saved in making up trains and track arrangements are less complicated. There is no comparison between the efficiency of the small mine with its hand labor and the big plant equipped with modern machinery for handling coal. The small mines absorb many laborers working at comparatively low efficiency at a time when every man should count. The large producers often have been handicapped by shortage of labor and poor transportation from making the proper use of their equipment, which represents a large investment.

A further thought suggests itself in connection with the small mines. Operators and miners have been working to the limit to produce coal. However, the time

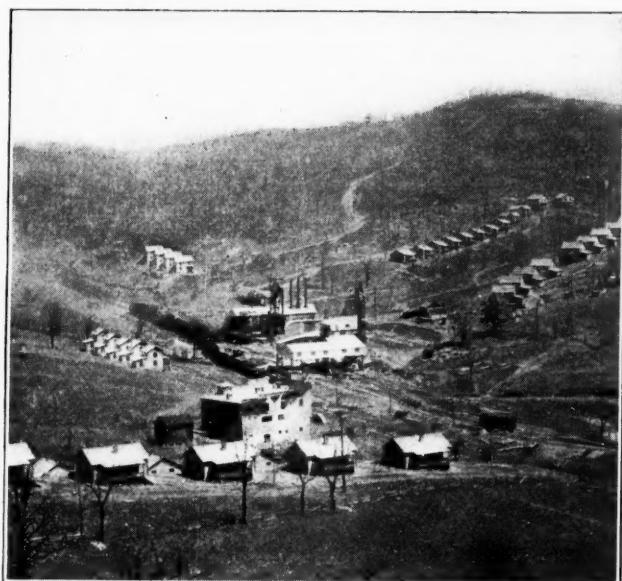


FIG. 2. BIRDSEYE VIEW OF MINE NO. 87

may come when changed market conditions will cause a return approaching the old competitive state of affairs. In that event what will be the fate of the small mine poorly equipped to mine coal in competition with the big plants? In the aggregate these small investments represent a significant sum which might have found better application at the time made and may constitute a considerable loss in the future. Advocates of directed expansion of the development of the country's resources might find an illustration of wasted effort in many of these small mines.

In 1915 the Consolidation Coal Co. shipped about 37 per cent. of the total production of Marion and Harrison Counties, West Virginia, for that year, and that performance holds good up to the present time. The location of the mines of this company in the Fairmont-Clarksburg region is shown in Fig. 4. In this section there are some fifty Consolidation mines, three-fifths of them, or the older plants, being on the main line between Fairmont and Clarksburg; the remainder and later operations are mainly on short branches. From

this region comes half of the total tonnage of the company; about one-quarter of its annual coal shipment is produced in the Elkhorn, Ky., field and the balance mainly from the Somerset, Penn., and Georges Creek, Md., divisions.

This company began shipping coal in 1864, when it mined 37,678 tons from the Georges Creek operations; shipments increased from this region until in 1900 they amounted to 1,299,374 tons of coal. In 1901 the Fairmont Coal Co. was acquired by the Consolidation, which gave the combination an additional tonnage of about 2½ million; the following year the production of the Fairmont properties was doubled. The Somerset Coal Co. was purchased in 1902, and the mines of this company located in Pennsylvania contributed around 1½ million additional tons of coal. The Millers Creek and Elkhorn regions of Kentucky were opened up by the company in 1911 and 1912 respectively; the former contributes about half a million and the latter some two million tons of coal annually. The aggregate tonnage from all these mines was 11,722,384 tons in 1915, the year of greatest production of this company. Bare statistics are generally dry reading, but an additional fact, the total production of the company from 1864 to the end of 1917—188,054,220 tons—would be an impressive statement at any time, more especially so during times of great demand for fuel.

A coal man can hardly fail to find much that is of interest in the 54th annual report of the Consolidation Coal Co. Under "Capital Assets," coal land and other real estate are valued at \$83,651,146 in round figures; deducting \$9,019,472 as reserve for exhaustion, there remains \$74,631,674. Under "Mining Plants and Equipment" there are a number of matters of especial interest; accordingly the main items of this account are given in the accompanying table under that head. The remaining or less important items are grouped under "Other Plant and Equipment." (See table I).

In the inventory of Consolidation plant and equipment, the most prominent item is "Mine Openings and Gradings"—a sum exceeding five million dollars is invested in underground development. This is an improvement which cannot be made available at short



FIG. 3. TYPICAL MINERS' HOMES—PENNSYLVANIA DIVISION OF CONSOLIDATION COAL COMPANY

notice—it takes time to drive entries, grade haulage roads and open up territory. If such improvements (narrow work) are kept well in advance of roomwork, the productive capacity of the mine can be greatly and quickly increased, which means more cars to load at the tipple. Steel rails represent a large investment to

an operation, in this case considerably over 1½ million dollars. Heavy rails on main haulage roads tie up large sums but prove an extremely good investment. Nearly a million dollars is represented in the case of tipples and an equal sum in mine cars. This company at present is engaged in some extensive improvements, over

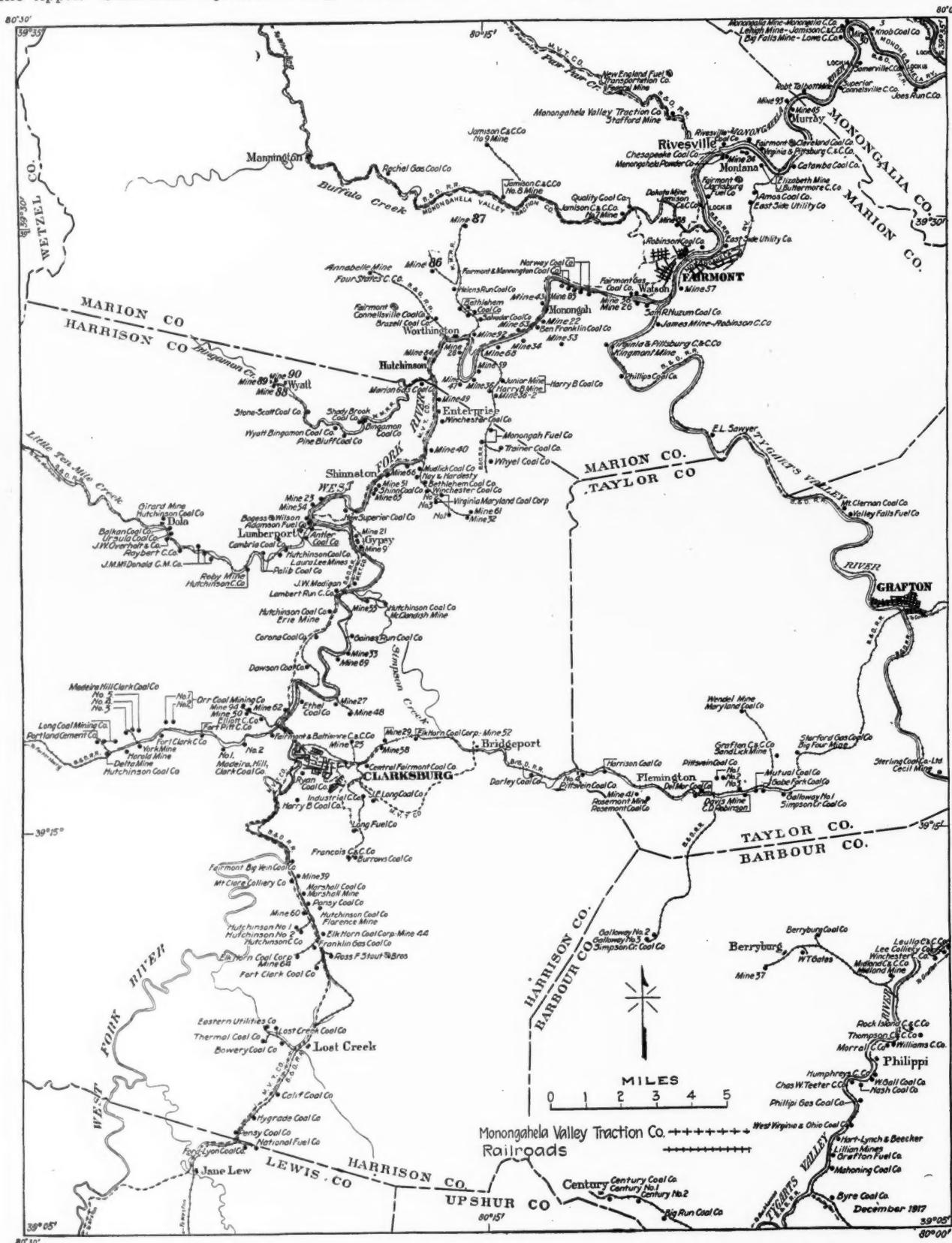


FIG. 4. LOCATION OF CONSOLIDATION MINES IN FAIRMONT REGION OF WEST VIRGINIA  
Consolidation mines are indicated by number—as Mine 86

two million dollars being assigned to new work (not completed) in the West Virginia division and something over half this amount to the Pennsylvania division. In West Virginia some fine modern plants are under way. Mines Nos. 86 and 87, on a branch from the main line and about seven miles due west from Fairmont, are about completed. A view of the steel tipple at No. 87 taken while under construction is shown in Fig. 1. A later view of this plant (a shaft proposition) is shown in Fig. 2. On another branch at Wyatt (seven miles southwest of mines Nos. 86 and 87) is another big plant under development. Here three drift mines, Nos. 88, 89 and 90, will send coal to one tipple for preparation.

The various items entering into haulage—locomotives, trolley wire and equipment—represent another million dollars; mining machines are charged up at over half a million and power plants, substation and equipment at two million more. The electric end of the Consolidation equipment is valued at nearly four million dol-

The setting given the scene by the background of trees and the trees among the houses have considerably more than an artistic value. In the case of many towns and municipalities throughout the country officers or commissions are maintained to look after the trees to protect them from injury and replace them when necessary. Many times when a mining town is laid out with no more expense for shade than the care of existing trees, abundant shade can be secured which will add greatly to the comfort and pleasure of future occupants of the houses of such towns. This idea seems to have been followed in the case of the village illustrated.

A further illustration is afforded in the view given in Fig. 7 of the benefit of preserving natural beauties about the sites of homes and other buildings. This company has gone to considerable expense in developing the new Elkhorn, Ky., field to provide many advantages for its employees. This section is remote from large towns, and many of the privileges enjoyed by those living in or near municipalities can be participated in by not

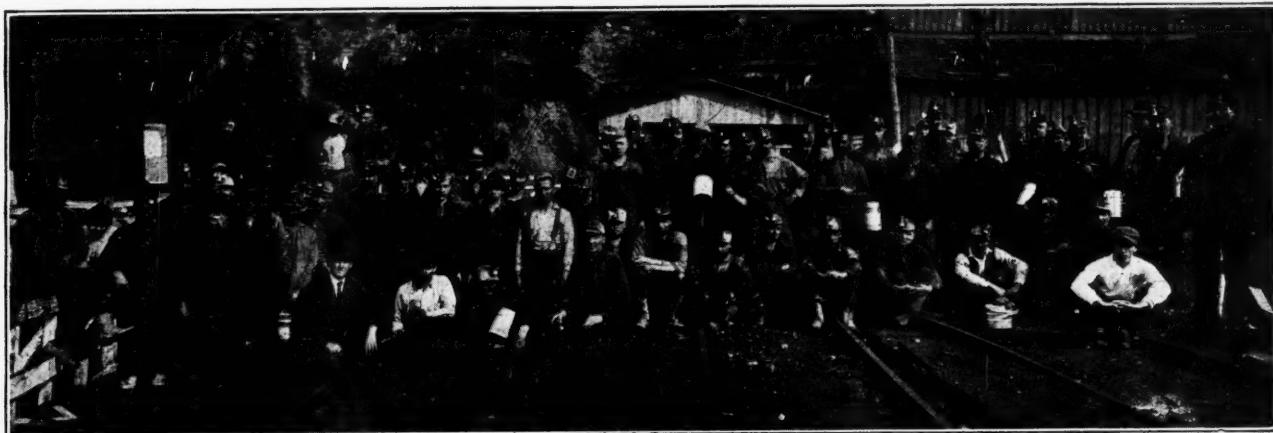


FIG. 5. GROUP OF MINERS AT CONSOLIDATION COAL COMPANY OPERATION

lars. An equal amount has been expended on tenement houses. Miners' houses, or "homes" as they should be termed in the case of this company, are shown in Fig. 3. This is a typical mining village of the better class.

only the Elkhorn but also the employees of the company in other divisions as well. The company's statement referred to previously shows that over one hundred thousand dollars have been expended in recreation and amusement buildings and equipment alone. The amount spent in town improvement is not brought out as a distinct item.

Many nationalities and diverse elements are represented in the typical group of miners shown in Fig. 5. These men were photographed at the entrance to Mine No. 36, in the Fairmont region of West Virginia. If the capacity of a boiler plant can be judged by the amount of fuel fed to it, then some of these workers should be quantity coal loaders, judging from the size of the dinner pails carried, supplemented by other indications of huskiness. These men surely do not come out of the mine at noon when they can load coal.

It is to be regretted that the mines in northern West Virginia have no better transportation service to move coal from the tipple to market. At present the region is on a little better than half-time work. Some ten to eleven hundred railroad cars furnish daily transportation to eastern points; of this tonnage part goes via Connellsville over the Western Maryland. President J. H. Wheelwright of the company stated that the tonnage output for 1917 was over  $1\frac{1}{2}$  million tons less than for

TABLE I. MINING PLANTS AND EQUIPMENT

Mine openings and gradings.....	\$5,240,407
Tipples and equipment.....	947,007
Power plant and substation buildings.....	417,122
Power plant and substation equipment.....	1,610,492
Ventilating equipment.....	319,555
Haulage equipment.....	336,531
Steel rails .....	1,693,331
Mine pumps and motors.....	253,692
Copper wire .....	269,794
Trolley wire and equipment.....	223,322
Mining machines.....	558,781
Locomotives .....	493,788
Mine cars .....	946,947
Water-works .....	441,512
Coke ovens .....	224,174
Tenement houses .....	3,904,805
Recreation and amusement buildings.....	86,451
Recreation and amusement equipment.....	17,255
Store buildings .....	438,217
Outside operations—buildings .....	102,642
Outside operations—equipment .....	509,024
Branch office equipment.....	352,709
Draffage tunnel .....	289,123
Other plant and equipment.....	1,755,424

IMPROVEMENTS (Not Completed)

Maryland division .....	\$15,287
West Virginia division.....	2,047,524
Pennsylvania division.....	1,182,740
Millers Creek, Ky., division.....	70,331
Elkhorn, Ky., division.....	285,370
Fairmont Mining Machinery Co.....	83,714
Total .....	\$25,117,071
Depreciation to Dec. 31, 1917.....	8,598,878
	\$16,518,193

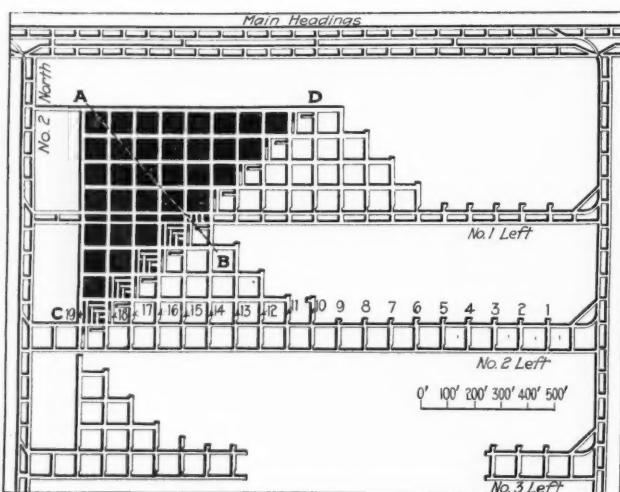


FIG. 6. GENERAL PLAN OF BLOCK SYSTEM OF MINING USED BY CONSOLIDATION COAL COMPANY

the preceding year. That this reduction in the production was caused by the failure of the railroad companies to furnish necessary transportation, which was very disappointing, especially in view of the large expenditures which had been made in opening and equipping new mines, and for additions and betterments in the extension of mines already in operation.

Prominent among the changes made by the Consolidation in betterments and methods at its mines is the adoption of the room-and-pillar panel method of mining on the block system. C. H. Tarleton, the manager of the West Virginia division of the company, is closely identified with this method as used today and states that it has the following pronounced advantages: (1) Absolute protection against squeeze and creep. (2) Greater safety to the miner while extracting pillar coal. (3) More economy in haulage, including track used; also economy in timber. (4) It permits of a more flexible method of removing or mining pillars. A comprehensive general plan of this method is shown in Fig. 6 and in detail in Fig. 8. Here the rooms are turned on 100-ft. centers and are driven 16 ft. wide and 400 ft. long from butt entries; rooms are connected every 100 ft. of advance by crosscuts which leave roof supports 80 ft. square. Never less than two pairs of butt entries are included in a panel, and where it is possible the panel is extended to cover three or four pairs of butts. The larger number of butt entries is preferred, as it is difficult to recover the barrier pillars left between panels as the coal is drawn from adjacent pillars down to it.

The block system permits of concentration of pillar work, which is well kept up as the rooms advance economically and safely. One of the greatest

mistakes in mining is made by not removing pillars in time. Many cases could be cited of mines where cross or butt entries were driven to the limit before a single pillar was drawn on a pair of entries; this being true when rooms were turned and worked on a half to a mile of entry before robbing of the pillars commenced. This was supposed to be necessary in order to begin robbing at the room pillar next to the face of the entry. This plan has so many well known disadvantages as to need no special comment. A squeeze may develop where pillars stand for a year or so; top rock falling buries track unless it is removed in time; timber deteriorates, and so on. In the plan noted in Fig. 6, robbing of pillars commences as soon as a room is driven to the limit; the break in the top rock follows a diagonal line across the rooms where the work is carried out systematically.

In mining by the block system little timber is used in advancing. The track is carried along the rib which will be first extracted, and one row of props is placed on the other side; in a wider room two or three rows of props would be used. Refuse is stored in space which will never have to be used for other purposes. When a room is finished the pillar block nearest the face is attacked and robbing proceeds as indicated on the detail map, Fig. 8. This plan does not show different blocks in relation to each other, but illustrates the same 80-ft. block at different stages of working. With this plan the amount of work on the face of the coal should be about 57 per cent., the amount of solid work in each block about 72 per cent. and the amount of pillar work 28 per cent.

In this plan of robbing 13-ft. openings are driven in the block from two points and the 7-ft. strips of coal next to the gob are recovered as noted; these narrow strips of coal are shown hatched when they are drawn. In case gas is encountered it is simply necessary to use a little canvas, the same as in any other method. In the room-and-pillar work steel ties and light rails are



FIG. 7. EMPLOYEES' CLUB AND OFFICIALS' HOMES AT JENKINS, IN THE ELKHORN (KY.) DIVISION OF THE CONSOLIDATION COAL COMPANY

used; this constitutes flexible track and one easily laid by the miner. The timber used while robbing progresses is saved where practicable. The Sylat mechanical post puller manufactured by W. Sylvester, Parkersburg, W. Va., is used for recovering props, and it is also found handy to get cars on the track again; it is also used in the shop on car work.

A special modification of the method of robbing described has been found to greatly facilitate the drawing both of the barrier pillars between the panels and also the room stumps. The fracture of the top works out better and the work is more concentrated in the case of this modified method. Mr. Tarleton states in explanation of this matter that instead of the roof break following the line *CBD*, Fig. 6, the blocks are attacked so that the roof fracture follows the line *CBA* in robbing. In general in the Pittsburgh seam it is often stated that about 95 per cent. of the coal is recovered,

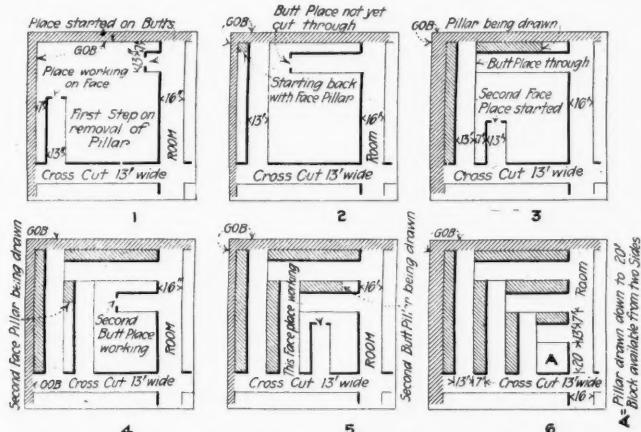


FIG. 8. DETAIL PLAN OF WORKING 80-FOOT BLOCK SYSTEM OF MINING

but some authorities who have given the matter considerable attention question whether such a high percentage of extraction is possible. It is thought by some that 85 per cent. recovery of coal is a more reasonable and practicable estimate. This is in view of the nature of the occurrence of the Pittsburgh seam; it is not all good coal to start with. There is usually a drawslate top over the main part of the seam; above this slate is a varying amount of coal of questionable value. Accordingly it is customary, where the drawslate tends to give trouble, to leave up from 4 to 8 in. of coal at a well defined parting to serve as a roof. In addition to the loss of much of this top coal, sometimes a slab of coal has to be left to hold back the gob in the robbed-out area. In view of all this, 85 per cent. is thought to be the actual amount of coal recovered.

The Consolidation Coal Co. has attained prominence not alone by virtue of the size of its annual shipments but by the excellence of the several products of its mines as well. The coals shipped to market by this company are the following well known fuels: The Georges Creek "Big Vein Cumberland," from Maryland; the Fairmont gas, locomotive and domestic, of northern West Virginia; the Millers Creek block and the Elkhorn coking, byproduct and gas coals of Kentucky, and the Somerset smokeless steam coals of Pennsylvania. These fuels took the highest award—the gold medal of honor—at the Panama-Pacific exposition.

The operating headquarters of this company is at Fairmont, W. Va., and executive offices at Baltimore, Md.; division offices are maintained at Fairmont, Frostburg, Md., Somerset, Penn., and at Jenkins and Van Lear, Ky. Sales offices have been established at Baltimore, New York, Philadelphia, Boston, Washington, Chicago, St. Louis, Detroit, Cincinnati, Louisville and Cumberland, and foreign offices at London and Genoa. The company has a controlling interest in the Northwestern Fuel Co., of St. Paul, Minn., the Metropolitan Coal Co. of Boston, and the Consolidation Coastwise Co., the last named corporation operating steamers and barges between ports on the Atlantic coast.

### Anthracite Shipments in November

The effect of the influenza epidemic in the anthracite region is shown in the decrease of more than a million tons in the shipments for November compared with the preceding month, as reported to the Anthracite Bureau of Information in Philadelphia.

The shipments during November amounted to 5,276,659 tons as compared with 6,286,366 tons in October, a decrease of approximately 1,010,000 tons. As compared with shipments during November, 1917, which amounted to 6,545,313 tons, the shipments last month show a decrease of 1,268,654 tons. Shipments last month were the smallest since February, 1917.

Conditions in the region have been much improved since December came in, the force of the epidemic having largely spent itself; but in addition to this there has been an increase in the supply of labor due to the return of men from the service and other occupations.

The shipments by companies were as follows:

	November, 1918	November, 1917	Coal Year, 1918	Coal Year, 1917
P. & R. Ry. ....	1,137,170	1,329,259	10,248,539	10,317,398
L. V. R.R. ....	973,865	1,158,158	9,884,413	9,844,000
C. R.R. of N. J. ....	450,360	557,090	4,626,285	4,698,230
D. L. & W. R.R. ....	776,506	1,012,330	7,831,046	8,380,629
D. & H. Co. ....	624,335	786,381	6,138,879	6,070,952
Penna. R.R. ....	364,193	457,970	3,624,634	3,758,277
Erie R.R. ....	554,026	720,308	5,873,373	6,069,673
N. Y. O. & W. Ry. ....	124,700	161,615	1,334,931	1,359,028
L. & N. E. R.R. ....	271,504	362,202	2,624,316	2,827,941
Total.....	5,276,659	6,545,313	52,186,416	53,326,128

### Coal Trade in Venice

In 1913 Venice imported 13,004,619 quintals (a quintal equals 220.46 lb.) of coal, more than twelve-thirteenths of which came from Great Britain. The sources of supply and quantities were: Great Britain, 12,040,145 quintals; Holland, 573,756 quintals; Austria, 354,386 quintals, and Germany, 35,882 quintals. This represents a year's supply under normal conditions. In 1914 the import was smaller, the total being only 10,311,070 quintals. More than nine-tenths of this, or 9,156,080 quintals, was supplied by England; Germany was the second source of supply, with 673,000 quintals; the United States, entering the market for the first time, was third, with 379,550 quintals; and Austria was fourth, with 102,440 quintals. In 1915 Great Britain was the sole source of supply and the entire import was only 2,076,330 quintals; and in 1916 the supply that entered by sea, entirely for naval use, was only 94,950 quintals. For military reasons no figures are available for 1917; importation was made entirely by the Government, which allowed certain industries to purchase a fractional quantity of the amount needed.

# Coal—How Analyzed

BY FREDERICK L. SERVISS

Golden, Colo.

**SYNOPSIS**—*Some terms used in coal specifications are as a rule but vaguely understood. The determination of the moisture, volatile matter, fixed carbon and ash are simple operations, but the determination of the sulphur and phosphorus content is much more complicated. The thermal content of a coal may be calculated, but a much better plan is to ascertain it exactly by burning a sample in a bomb calorimeter.*

IT IS sometimes surprising to the technical man to note how few coal operators are familiar with the tests to which their product is subjected by many purchasers. They are bewildered when they read the report of such an analysis. Volatile matter, fixed carbon, sulphur and ash are vaguely understood, but an "air dry," "as received," "moisture free," or "moisture and ash free" basis of analysis means little or nothing to them.

Undoubtedly a short, simple explanation of these several tests will be of interest and value to the practical man. This article was written with that idea in view. Short, definite explanations are given wherever necessary, in order to insure a thorough understanding of the subject. No long involved chemical or technical processes are discussed, other than those required, and these are then made plain in simple language.

Coal when received in sample lots at the laboratory has been prepared in a systematic manner. The sampling of anything to be analyzed is as important as the analysis itself, and must be carefully and conscientiously carried out in order to insure correct results. In preparing a laboratory sample, a large quantity of coal is started with. This is reduced to approximately the same size and thoroughly mixed. In mixing, care must be taken to have each portion a representative of the whole. If too bulky, the sample is reduced by quartering. The ordinary laboratory-size sample is about one pound, or nearly 450 grams, the gram being the unit of weight employed in analysis.

The sample is next crushed so as to pass through a 60-mesh screen, either by rotating it in an air-tight ball mill or otherwise. After being crushed, the coal is passed through an automatic sampler which reduces the size of the sample by halving it, until a small sample of about 50 grams is obtained. From this it is easily seen why special care must be taken to insure an intimate mixture at the start. This 50-gram sample is passed through a 60-mesh sieve, any larger lumps are removed, crushed by hand, and added to the sifted portion.

Should the analysis be made upon an "as received" basis, the sample is placed in a bottle and sealed. This bottle is large enough so that the coal will not fill it more than two-thirds full. It is then agitated either mechanically or by hand until it is certain that the coal is thoroughly mixed. It is now ready for the analyst.

Assuming that the analysis is to be made on the basis

of "air dry," the coal when received at the laboratory, the 60-mesh sample, is first weighed and then placed in a drying oven and dried at about 95 deg. F. for 8 hours, after which it is again weighed. The loss in weight is known as the "air drying loss," but must not be regarded as accurate, or that a high loss is indicative of poor coal. In coal analysis, the following constituents are determined: Moisture, ash, volatile matter, fixed carbon, sulphur, phosphorus, calorific or heating value, specific gravity, true and approximate.

The use to which the coal is to be put determines whether or not all or only certain of the foregoing constituents shall be determined. In the iron and steel industry there are certain elements in the coal which, if not determined accurately, will affect the resulting product. Phosphorus and sulphur are most detrimental and must be carefully checked. The ash content is determined accurately for this kind of work, in order that the calculations for the amount of limestone to flux the ash may be made. Coke is almost universally used in the iron industry, but the same analysis will apply to coke as to coal.

#### EFFICIENCY OF COAL REDUCED BY MOISTURE

Moisture in a coal reduces its heating efficiency. One per cent. of moisture averages a loss of 13 B.t.u. for each pound of coal burned, or at a rate of 26,000 B.t.u. per ton. From this it is evident that moisture is detrimental, even in small amounts; besides it also reduces the rate of combustion.

Ash, or earthy matter, in a fuel is of considerable importance in determining the heat value of a coal. Moisture is determined by drying one gram of the coal, "as received," in a weighed crucible. The crucible is heated to 230 deg. F. for an hour. It is then cooled in an air-tight container to prevent reabsorption of moisture from the air, and weighed when it reaches room temperature. Where great accuracy is desired, the moisture content analysis must be made upon samples of coarse as well as finely ground coal. When, as is usually the case, more moisture is found in the coarse sample, a correction must be applied to the results, but the determination of this factor is of interest to the analyst alone and need not be taken up here.

The ash is determined by burning a weighed amount of coal, usually a gram, from the previously prepared air-dried sample, in a small crucible over a low gas flame, until the coal is free from carbon and all the volatile matter driven off. Slow heating is necessary in order to prevent coking and render the coal more easily burned to ash. The crucible is finally heated to bright redness until all black material is burned out.

The crucible with its contents is cooled to room temperature and weighed. It is heated to redness again for 30 min., cooled and weighed again, and so continued until the difference between two successive weights is 0.005 gram or less. The residue left in the crucible represents the ash content of the coal and is expressed in per cent.

Volatile matter is determined by placing one gram of the undried powdered coal in a weighed crucible having a closely fitting cover. This is heated over the free flame of a bunsen burner for 7 min., cooled and weighed. The loss in weight minus the moisture content of one gram represents volatile matter and is expressed in per cent. Fixed carbon is found as follows: 100 minus the sum of the ash moisture and volatile matter is known as fixed carbon and is also expressed in per cent.

The determination of sulphur is more exact, and to understand it a certain knowledge of chemistry is desirable. Sulphur in coal exists in many forms, among which are pyrite or iron sulphide, organic sulphur and compounds of sulphur known as sulphates. By heating a weighed amount of the coal in a crucible with a definite mixture of magnesium oxide and sodium carbonate, with access of air, the sulphur and its compounds are changed to alkaline salts which are dissolved by boiling in distilled water. This is now filtered to separate the solution from the solid matter.

#### HOW TO DETERMINE SULPHUR CONTENT

Bromine water and hydrochloric acid are added to the clear solution, which is again boiled; after boiling for a few minutes to expel the bromine, a solution of barium chloride is added slowly, drop by drop. Upon the addition of the barium chloride a cloudy, white precipitate is formed, which is insoluble. After allowing this precipitate of barium sulphate to settle, it is filtered and washed with hot water, then dried. When dry it is ignited and burned until white, after which it is cooled and weighed. From the weighed barium sulphate the sulphur content of the coal may be figured by multiplying it by 0.1374.

The determination of phosphorus, like that of sulphur, must be accurate and great care must be taken in the analysis. Phosphorus may be determined in several ways, but the most used is what is known as weighing the "yellow precipitate." The ash from burning ten grams of coal is fused with a mixture of sodium carbonate and sodium nitrate, dissolved in water, acidified with hydrochloric acid evaporated to dryness, and hydrochloric acid and water again added. The insoluble matter is filtered off and the clear solution treated as follows: Nitric acid is added and the solution boiled down rapidly to a small volume, ammonium hydroxide is added until a permanent precipitate forms, then nitric acid is added until the precipitate dissolves, and a few drops are added in excess. The solution should be heated to near boiling, then a measured amount of a previously prepared molybdic acid solution is added, and the whole shaken for 15 min. The yellow precipitate which results is known as ammonium-phospho-molybdate. This is then carefully dried at 220 deg. F. and weighed. The phosphorus may be determined by multiplying the weight of this precipitate by the proper factor.

The heating power of a coal is understood to mean the total amount of heat liberated by the complete combustion of a unit weight of the fuel. It is customary to select the pound as the unit of weight, which with the Fahrenheit scale of temperature results in the British thermal unit, or B.t.u. The heating power of a coal or coke may be calculated with fair accuracy for many purposes from Dulong's or other formulas. The

results thus obtained, however, are only approximate, and for accurate results the direct combustion of the fuel in a bomb calorimeter is used. The manipulation is as follows. There are many styles of calorimeters, but the principle is the same, and the method here explained will apply to almost any type.

A weighed sample of the 60-mesh coal is placed in a platinum tray. One terminal of the igniting circuit is connected to this dish, which is placed in the bomb, or heavy steel tube fitted with a tightly screwed-on cap. The cap is put securely in place. To insure ignition of the coal in the bomb a piece of fine iron wire is connected to the other terminal of the firing circuit, and placed so as to touch the coal sample in the tray.

After screwing on the cap, oxygen is pumped into the bomb until a pressure of 20 atmospheres, or about 280 lb. per square inch, is reached. The needle valve through which the gas was pumped is closed so as to allow no escape of gas. The bomb is now placed in a polished copper pail, containing a weighed amount of water, enough to cover the bomb about an inch above the top, and this pail is placed in an insulating jacket. The firing terminals are connected to the switch and the temperature of the water read accurately, often to 0.001 deg. C. The switch is then thrown, combustion takes place within the bomb, and the resulting rise in temperature of the water is noted. From the temperatures read, knowing the weight of water used and the specific heat of the bomb and the copper pail, the heat value of the coal may be determined and expressed in B.t.u.

#### EASY TO DETERMINE SPECIFIC GRAVITY

Frequently specific gravity, both true and apparent, is asked for and may be found with ease. Select a lump of the coal (one weighing about half a pound will do nicely) and weigh it. Call this weight A. Place the lump in a glass of distilled water for a few minutes, remove it and carefully wipe off the excess water, and weigh again. Call this weight B; then the increase in weight  $B-A$ , we will call C. Weigh the lump while suspended in a glass of water. Call this weight D. Then,

$$\frac{A}{(A-D)} = \text{true specific gravity}$$

while

$$\frac{A}{A-(D-C)} = \text{apparent specific gravity.}$$

The heating value of the coal as determined by the combustion of a sample in an atmosphere of oxygen does not give the real commercial power, since this is dependent upon the character of the furnace and its operation, as well as on the composition of the coal. Where a number of grades of different fuels are available (for say steaming purposes), it is found best to conduct a series of tests upon these fuels and determine which will evaporate the most water under operating conditions for the least money; and that which is found to be the cheapest is nearly always chosen. However, it is advantageous for a plant operator to know the heat content of the coal he uses. The evaporation of so many pounds of water by so much coal is not indicative of efficiency, therefore a determination of the heat units contained in the coal is essential to a thorough knowledge of its value.

# Some Characteristics of American Coals in Byproduct Coking Practice—III

BY F. W. SPERR, JR.

Chief Chemist, The Koppers Co., Pittsburgh, Penn.

**SYNOPSIS**—There was a time when the analysis of a coal gave little indication as to its coking qualities; its physical appearance was supposed by be a safer guide in this connection. This was true of beehive oven practice. With the extension of the byproduct coke oven and a more intimate acquaintance with the various coals new theories have been adopted.

THE geological age of a coal is no criterion as to its coking quality. As good byproduct yields and as good coke are obtained from the comparatively recent coals of Colorado as from the early carboniferous

Examples	Low-Oxygen Coking Coals		High-Oxygen Coking Coals	
	Appalachian Bituminous Coal Fields	Illinois, Indiana, Washington	Illinois, Indiana, Washington	Illinois, Indiana, Washington
Shape.....	Blocky.....	Slender, tapered, fingery		
Hardness.....	Hard.....	Soft		
Exterior surfaces.....	Even.....	Sometimes smooth; but often having transverse seams or sometimes even masses of pebbly carbon		
Cell-structure.....	Regular—usually heavy cell walls	Irregular—thin cell walls		
Byproducts: Gas.....	High yield—rich—little CO or CO <sub>2</sub>	Low yield—lean—much CO <sub>2</sub>		
Tar.....	High yield—thicker—high specific gravity—less tar acids	Low yield—thin—lower specific gravity—more tar acids		
Ammonia.....	Normal	Often higher		
Benzol.....	Normal	Irregular		
Combined water.....	Low	High		
Rate of coking.....	Normal	Slow		
The excess of fusible bituminous matter accumulates in the upper center of the oven, forming a wedge-shaped, honey-combed mass, called "sponge"				
Any excess of fusible bituminous material forms pebbly masses more or less loosely agglomerated and not always confined to the center of the oven				



FIG. 9. COKES FROM MIXED COAL

Left—Coke from mixture of 85 per cent. Pittsburgh + 15 per cent. Pocahontas coals; made slowly in wide oven; thirty hours' cooking time; appearance in oven. Right—Coke from mixed coal: 85 per cent. Pittsburgh + 15 per cent. Pocahontas; made rapidly in wide oven; sixteen hours' cooking time; appearance in oven; note sponge in upper part.

strata of Pennsylvania. The coking properties of the Lower Kittanning seam undergo most remarkable changes parallel with the extent of devolatilization southeastward from Allegheny and Fayette Counties, Pennsylvania, to the Potomac basin in Maryland. The phenomena of prime importance seem to be those of deoxidation rather than of devolatilization. The highly oxygenated coals of Illinois may have less volatile

TABLE V. SULPHUR ELIMINATION IN COOKING COALS IN KOPPERS OVENS

State	County	Seam	Coking Time, Hours	Sulphur		
				Per Cent. in Coal	Coke Yield, Per Cent.	Per Cent. of Total Eliminated
Colorado.....	Pueblo and Gunnison	.....	21.5	74.0	0.68	0.57
Colorado.....	Pueblo and Gunnison	.....	19.0	74.0	0.58	0.52
Colorado.....	Pueblo and Gunnison	.....	19.5	73.0	0.51	0.47
Colorado.....	Pueblo and Gunnison	.....	20.0	75.5	0.58	0.53
Colorado.....	Pueblo and Gunnison	.....	18.0	73.0	0.58	0.54
Colorado.....	Pueblo and Gunnison	.....	19.5	74.0	0.63	0.40
Alabama.....	Jefferson.....	.....	18.0	75.0	0.99	0.84
Alabama.....	Jefferson.....	.....	18.0	75.0	1.07	0.92
Alabama.....	Jefferson.....	.....	18.0	75.0	0.99	0.99
Alabama.....	Jefferson.....	.....	17.0	75.0	0.79	0.64
Alabama.....	Jefferson.....	.....	18.	75.0	1.39	1.17
Alabama.....	Jefferson.....	.....	18.0	75.0	1.17	1.06
Alabama.....	Jefferson.....	.....	18.0	71.0	1.25	1.23
Pennsylvania, Allegheny.....	Pittsburgh.....	20.0	70.0	1.12	0.84	47.5
Pennsylvania, Fayette.....	Pittsburgh.....	17.0	68.0	1.03	0.95	37.3
Pennsylvania, Fayette.....	Pittsburgh.....	19.0	68.0	1.03	1.00	34.0
Pennsylvania, Westmoreland.....	Pittsburgh.....	19.5	71.0	1.85	1.50	42.4
Pennsylvania, Washington.....	Pittsburgh.....	20.0	72.0	1.06	0.76	48.3
Pennsylvania, Fayette.....	Pittsburgh.....	19.0	75.0	0.87	0.75	35.3
Washington.....	Pierce.....	No. 6.....	17.5	70.0	0.60	0.58
Washington.....	Pierce.....	Mostly No. 6	19.0	70.0	0.53	0.46
Washington.....	Pierce.....	No. 7.....	19.0	76.0	1.70	1.57
Washington.....	Pierce.....	No. 8.....	19.0	72.0	0.46	0.49
Washington.....	Pierce.....	No. 8.....	17.5	72.0	0.54	0.51
West Virginia, Preston.....	Lower Kittanning	.....	17.5	70.0	1.84	1.56
West Virginia, Marion.....	Pittsburgh.....	16.5	68.0	1.48	1.56	28.3
West Virginia, Marion.....	Pittsburgh.....	16.5	68.0	1.62	1.63	31.6
Mixtures with Pocahontas Coal						
Illinois.....	20 per cent. Illinois + 80 per cent. Pocahontas	18.0	84.0	0.87	0.75	27.7
Pennsylvania, Fayette.....	85 per cent. Pittsburgh	20.0	71.0	0.90	0.72	43.3
Pennsylvania, Fayette.....	60 per cent. Pittsburgh	20.0	75.0	0.77	0.67	34.8
Pennsylvania, Fayette.....	60 per cent. Pittsburgh	22.0	78.0	1.05	0.96	28.7
Pennsylvania, Fayette.....	85 per cent. Pittsburgh	21.0	71.0	1.07	0.81	46.4
Pennsylvania, Fayette.....	70 per cent. Pittsburgh	20.0	73.0	1.05	0.79	45.1
Pennsylvania, Fayette.....	60 per cent. Pittsburgh	20.0	73.0	1.03	0.76	46.2
Pennsylvania, Fayette.....	20 per cent. Pittsburgh	18.0	84.0	0.79	0.69	46.7
Kentucky.....	75 per cent. Pond Creek	20.0	75.0	0.55	0.49	33.2
Kentucky.....	75 per cent. Pond Creek	22.0	76.0	0.64	0.67	20.4
Kentucky.....	30 per cent. Elkhorn	20.0	80.0	0.69	0.68	21.2
Kentucky.....	75 per cent. Pond Creek	20.0	75.0	0.52	0.48	30.9

matter than coal from a portion of the Pittsburgh seam and yet produce a much inferior coke. In fact, the best basis we have for differentiation, with respect to coking quality, seems to have close relation to high- or low-oxygen content. We might make the above com-



FIG. 10. COKE FROM MIXTURE OF 85 PER CENT. PITTSBURGH + 15 PER CENT. POCOHONTAS COALS  
Made slowly in wide oven; thirty hours' coking time; appearance on bench

parisons of these two kinds of coal with approximately the same percentage of volatile matter.

It would be very interesting to compare the results of normal geological deoxidation, such as has occurred in parallel undisturbed strata, like the Freeport, Kittanning and Pittsburgh seams in Allegheny County, Pennsylvania, with what one might term "accelerated deoxidation," such as has occurred from the western to the eastern portions of the Lower Kittanning seam. Additional data must, however, be accumulated before we can begin to generalize on this subject. The famous Pittsburgh seam is the most regular and dependable of any with which we have to deal. Even in this seam, however, the percentage of volatile matter drops gradually from about 37 per cent. in the western portion to about 27 per cent. in portions of the Connellsville basin. Attention has heretofore been given principally to this phenomenon of devolatilization, and it would be interesting to study the variation in coking quality from the standpoint of deoxidation. Here the differences in oxygen content are relatively smaller, and, in spite of the considerable range of volatile matter, we actually find comparatively small differences in the coking quality of different parts of the seam.

Fig. 9 shows coke made from Pittsburgh coal + 15 per cent. Pocahontas in ovens of 20 in. average width, coked

the more highly oxygenated coals of Illinois and Indiana. Its low ash and sulphur content and high byproduct yields place it in the first rank of our best coking coals. It makes no sponge; but the coke shows some pebbly carbon like that characteristic of Illinois coals.

The data (Table V) showing the elimination of sulphur in coking various coals in byproduct ovens are of considerable practical importance. The figures for Alabama coals and for mixtures of Pennsylvania with West Virginia, and Pennsylvania with Kentucky coals



FIG. 11. COKE FROM MIXED COAL; 85 PER CENT. PITTSBURGH + 15 PER CENT. POCOHONTAS  
Made rapidly in wide oven; sixteen hours' coking time; appearance on bench

17 hours and 30 hours respectively, heats having been adjusted to the coking time. Figs. 10 and 11 show the cokes from these ovens on the bench. Please note the difference in the amount of sponge, which is quite characteristic. The 17-hour coke, although it is smaller sized and more cross fractured, is stated to give excellent results in the blast furnace. In ovens somewhat narrower, such as those at St. Paul, and with a coking time of 19 hours, the Pittsburgh coal gives very little sponge.

The Elkhorn coal, the development of which in the last few years has been one of the prominent events in the coal industry, appears to occupy a position midway between the eastern high-volatile coals and

are each averaged from a large number of tests; the other figures are from individual tests. Please note the high percentage expelled in coking Pittsburgh coal and the lower percentage from the higher oxygen coals of Washington and Kentucky. J. R. Campbell<sup>1</sup> has observed the higher percentage of sulphur elimination in the byproduct oven, and states that in beehive practice they figure on about 20 per cent. elimination.

### Use of the Cement Gun in a Bituminous Coal Mine

By M. S. SLOMAN  
Pittsburgh, Penn.

Numerous experiments have been made and exhaustive tests conducted by the Bureau of Mines and various coal companies in the bituminous fields on the application of a cement coating on roofs and ribs to prevent weathering and the costly falls of rock arising from this cause. While considerable work has been done in this direction, the results obtained have, until recently, been considered of rather questionable value by some who have been waiting to see the condition of the coating after it had been applied for a considerable length of time. The United Coal Corporation, of Pittsburgh, Penn., with several large operations, was one of the first

ing to the risk involved, no man-trip could be run and the miners were obliged to walk in and out from work. It was on this slope that the work was started on Nov. 1, 1917.

The equipment consisted of a "N-1" cement gun. Essentially this consists of a hopper with control valves for mixing the material and a nozzle at the end of a hose, where the dry sand and cement, conducted under air pressure, are mixed with water and directed at high velocity onto the surface to be coated. This apparatus is mounted on wheels of suitable track gage, making it entirely portable.

In this mine, as in many others electrically equipped, there is no supply of compressed air available. To meet demands of this nature, a Sullivan electrically operated portable air compressor was developed. This can be conveniently taken into the mine to the location of the work.

Since there was no supply of water under pressure available for this use at the Edna mine, an ingenious system was used. A large tank, of a size to hold sufficient water for a shift, was mounted on a mine car; a connection was made with the air receiver and this water, brought under pressure, was forced up to the spraying nozzle.

The work is done at night by a crew consisting of



TWO VIEWS OF THE CEMENT GUN AT WORK IN THE EDNA MINE

to become interested in this subject, and the results obtained by it seem to prove conclusively that a cement coating, properly applied, will form a permanent barrier to the action of weathering on roofs susceptible to air slacking.

The work has been carried on at the Edna No. 1 mine, located at Adamsburg, Westmoreland County, Penn., near Pittsburgh, where it is working the Pittsburgh seam, averaging 6 ft. in thickness, with the characteristic roof coal of about 12 in. and above that a slate and clay composition containing limestone which is readily disintegrated by contact with air. Without question this cement-gun coating was applied under adverse conditions. The coal is taken from the mine through a main slope, first started some 18 years ago, and driven in 6500 ft. Trouble has been encountered from the start due to falls of roof, as evidenced by the average distance from the coal to the roof, which is about 12 ft.—frequently the road was completely blocked by such falls, necessitating the closing of the mine on an average of three or four days every summer. Ow-

from 5 to 8 men. One man operates the gun, one the compressor (also serves as general mechanic), two others mix the material and one operates the nozzle; in addition, the following men are employed outside for part of their time: One hauls material, one dries sand and one handles the hoisting rope when the machine is working on the grades.

It was found that the mixing could best be done outside the hopper, and accordingly wooden boxes are used for that purpose and the mix dumped into the hopper. The mix consists of three parts fine sand (and this must be thoroughly dry) to one part Portland cement. The air pressure for the most effective work should be from 40 to 60 lb., while the water should be under a pressure about 20 lb. higher if possible.

The surface to be coated is first thoroughly cleaned and scaled. This is most essential. It is the opinion of Mr. Maize, the local superintendent, that where possible the use of a stream of water would prove very effective. No wire or reinforcement of any kind is used in coating the bare roof and side walls, and the coating is applied direct, averaging  $\frac{1}{2}$  in. in thickness.

<sup>1</sup>Trans. American Institute Mining Engineers, 1916, liv, p. 181.

Pieces of coating afterward broken off show a perfect bond existing between the cement and the substance composing the surface, whether it be coal or rock. In coating the timbers,  $\frac{1}{2}$  in. wire mesh is first stretched and secured to the surface before the cement is applied.

An accurate record of progress and costs has been kept from the start and these figures will no doubt prove interesting. The total cost of coating 6250 ft. of slope, averaging 12 ft. in width and 12 ft. in height on sides, has been \$7488.58. This figures a net cost of 30c. per square yard.

The following figures taken at random show detailed costs on a length of 900 ft. of slope which was completed in  $13\frac{1}{2}$  shifts of 8 hours each.

1 mechanic.....	\$71.85
1 engineer for rope hoist.....	65.48
1 operator cement gun.....	71.85
2 mixers at \$63.45.....	126.90
1 man at nozzle.....	63.45
1 man drying sand.....	61.40
1 man haul material part time.....	23.50
540 sacks cement at 60c.....	324.00
1620 sacks sand at 12c.....	194.40
Total .....	\$1002.83

This section figured about 36 sq.ft. per foot of advance, making the actual cost on this work 27c. per square yard of surface coated. This cost, as will be noted, included the outside engineer, which charge would not be necessary in most cases. It is interesting to note the progress made, which approximated 90 sq.yd. per shift of 8 hours.

In addition to the main slope, the entries and breakthroughs are coated. The "gun" has also been used with success in making stoppings air-tight and in building up permanent stoppings.

This can be done by building up a wall of loose rock and then applying a thick coating of cement. An excellent air-tight stopping is the result.

It would seem that the coating has stood a sufficient length of time on the slope to enable one to judge as to its permanence. A large part of the coating has withstood the rigors of the coldest winter yet experienced, and the heat of an extremely hot summer. It is today in excellent condition and looks as strong and unbroken as when first applied. In a few exceptional cases only, and these confined to small areas, has any spalling of the coating occurred. This was attributed entirely to improper cleaning of the wall before the coating was applied. The beneficial results obtained at this mine have been such as to more than offset already the initial cost of the equipment and the cost of the work. Not a single fall of roof has taken place in sections coated and, consequently, there has been no forced closing of the mine as was previously the case. This saving alone can be computed in dollars and cents. A regular man-trip is now run in and out of the mine and the elimination of the long walk on the part of the miners has done much to make them more contented and efficient during times of maximum production.—*Mine and Quarry*.

## Coal Roof Support

An operator possessing a thick seam of coal at times has some of the advantages and disadvantages of a person with a fat wallet. He is fortunate in having surplus coal to spare if demanded, but when used for purposes where recovery later is doubtful, it might be an advantage if the seam was not of sufficient height to

permit of its being so used. This thought was suggested by the accompanying illustration, which shows an entry in the Pittsburgh seam in the northern part of West Virginia.

At the mine where this photograph was taken this coal seam runs about 7 to 8 ft. in thickness. Immediately above the main portion of the bed there is often a bad draw slate, on top of which generally is a bench of inferior coal. It has been found safer and more economical under such circumstances to leave up from 4 to 8 in. of coal to serve as a top. The unfortunate part of this plan is that this top coal is generally lost. From a conservation standpoint it is a waste.

An experiment has been tried in recent years to supplement the coal roof noted by arches of coal in entries. Over a mile of straight entry was thus driven and a good opportunity given to note the results of this method of roof treatment. In the illustration a curved arch is shown starting just beyond the patent mine door, which is standing open temporarily. Another form of arch was also tried in which the lines of the arch are straight, the corners at the top being diagonal, along the lines a brace would take if used in timbering. This latter form was called a "box" arch. In shooting the coal at the entry face three shots were placed—a center shot and one on either side—all near the top. The arch was then trimmed up by pick to the shape desired. The arch is not favored by the company operating the mine where the photograph was taken, one reason being given



CURVED-ARCH COAL TOP AND PATENT DOOR

that when electric wires are strung along the top the arch coal must be taken down. It is most desirable to avoid the use of timber props on haulageways, and a number of substitutes have been tried to hold up the roof, among such being a coal arch. The entry illustrated is from 10 to 11 ft. wide and the arch support was an interesting experiment.

It was fortunate that a photograph of the entry showing the coal roof support includes a view of a Canton automatic mine door, made by the American Mine Door Co., of Canton, Ohio. The details of this equipment are more clearly indicated on account of the door being open. The operation and advantages of this device are so well known to coal men as to need little comment. By its use the human element is done away with, and with its elimination the great danger to the trapper attending the oldtime door. It has been appropriately stated that even a runaway car or trip passes through this automatic door as safely as a slow mule. The door is the result of years of experimentation.

# The Fuel Problem of Brazil

Prepared for *Commerce Reports* by the Latin American Division, Bureau of Foreign and Domestic Commerce

**SYNOPSIS**—*Rich in vast tracts of land suitable for agricultural and grazing purposes, Brazil is handicapped by the lack of fuel. During the war the country was forced to depend mainly on her own resources for fuel. An analysis of Brazilian coals shows that when used with the steam engine they deliver more horsepower per pound of coal than do the best grades of Pocahontas or New River. Federal Government aids development by making loans.*

THE war has served to accentuate sharply the absence of adequate supplies of native fuel in Brazil. The restriction of imports, first from Europe and now from the United States as well, has forced the Republic for the first time in its history to depend upon its own resources. Recent Latin American circulars issued by the Bureau of Foreign and Domestic Commerce on the Brazilian trade balance and foreign exchange and on the war and Brazilian food-stuffs summarize briefly the rapid strides which Brazil is making toward economic independence and the diversification of her agricultural products. Rich in vast tracts of fertile land suitable for agricultural and grazing purposes, possessing roughly some 1,500,000 square miles of timberland, and the fortunate owner of extensive deposits of iron and manganese, Brazil is finding itself hampered at every turn by the shortage of one prime necessity—fuel.

A coal commission, appointed by the Federal Government, made an extensive examination of the coal fields of the country during 1904 and 1905 and reported the existence of coal suitable for briquetting in the three southernmost states—Rio Grande do Sul, Santa Cath-

Before the war it was easier and cheaper to import coal than to attempt the mining of the native product, which was inaccessible and of inferior quality. Fuel oil was apparently in little demand before 1913. Wood was used where coal could not be obtained, but proved an expensive and wasteful fuel. Comparatively little capital was used for the equipment necessary to generate and utilize hydroelectric power. Hence, prior to 1914, with the exception of wood, the greater part of the fuel used in Brazil was imported.

The restrictions placed upon exports of fuel by the allies since the beginning of the war and the accompanying high prices have forced Brazil, temporarily at least, to resort in part to native fuel. Under this stimulus Brazil is beginning to exploit her native coal fields and is experimenting with oil extracted from the Bahia shale. For the most part, however, the present shortage is being relieved by the increased use of wood. Although the import figures for the war years 1914-1917 can not be said to equal the consumption as the import figures for prewar years do, it is nevertheless true that only a small per cent. of the shortage occasioned by the decreased imports has been met by native fuel.

The accompanying tables show the steady increase in the quantities of fuel imported during the four-year period immediately preceding the war and the steady decrease during the four-year period of the war, coupled with the increase in cost.

The following table, compiled from official Brazilian statistics, contrasts the steady increase in the quantities of fuel imported during the four-year period immediately preceding the war with the steady decrease during the four-year period of the war. Bitumen, the last article listed in the tables, includes coal tar and oil for manufacture of gas:

Fuel	Prewar Imports				War Imports			
	1910 Metric Tons	1911 Metric Tons	1912 Metric Tons	1913 Metric Tons	1914 Metric Tons	1915 Metric Tons	1916 Metric Tons	1917 Metric Tons
Coal	1,581,718	1,736,213	2,098,842	2,262,347	1,540,126	1,163,760	1,024,486	818,327
Briquets	181,620	220,136	206,804	230,049	241,977	108,706	64,351	5,908
Coke	9,954	12,584	12,563	17,164	9,128	3,820	2,484	1,703
Mineral fuel oil	.....	.....	.....	9,680	35,058	61,465	100,623	51,154
Bitumen	848	698	1,599	1,907	454	448	441	583
Total	1,774,140	1,969,631	2,319,808	2,530,156	826,743	1,338,199	1,192,385	877,675

erina and Parana. Thin coal seams of inferior quality were also reported in Sao Paulo and lignitic coal has been discovered along the tributaries of the Amazon in the States of Para and Amazonas. The oil resources of the Republic are apparently confined to the oil of the Bahia region, and a rather indeterminate area of scattered indications in the interior. Wood is the native fuel which is abundant in all parts of the country. No list of Brazilian fuel resources is complete, however, without a mention of the hydroelectric possibilities of the many powerful waterfalls and cascades which are fortunately prevalent in the accessible coastal highlands and along the edges of the interior plateau. In fact, the recent industrial development of Rio de Janeiro and Sao Paulo is largely due to the availability of ample water power.

The war period has been characterized by two important factors in the increase in price of imported fuel and the shifting of the chief source of supply from England to the United States.

An analysis of the 1913 imports shows that England supplied over 1,900,000 metric tons of coal, 237,000 tons of patent fuel, 14,000 tons of coke, and 900 tons of bitumen, or about 86 per cent. of the total fuel imports for the year, while the United States only supplied 274,789 tons of coal, 2200 tons of fuel oil, and 100 tons of bitumen, or about 11 per cent. of the total fuel imports for the year.

In 1917 the United States supplied 642,428 tons of coal, the principal item of import, or 78.5 per cent. of the total amount imported during the year, while England only supplied 172,866 tons, or 21 per cent. of the

total imports. The imports of all forms of fuel have been decreasing since the war, with the one exception of fuel oil, which has been increasing. No statistics are available showing the origin of imports of oil for 1917, but during 1916 the total imports amounted to \$1,375,154, of which \$1,024,627 came from Mexico and \$169,446 from the United States.

According to the Retrospecto Commercial, a ton of best quality Cardiff coal, which sold for 48 milreis before the war, was worth 110 milreis in 1916, an increase of 129.16 per cent. This increase must, of course, be attributed in part to the decline in the value of the Brazilian paper currency as well as to the increased cost of coal itself and increased cost of transportation. The following table shows the enormous increase in the cost of imported fuel during the period 1913-1917. The prices are quoted in paper milreis, per metric ton, c. i. f. Brazil:

Fuel	1913, Milreis	1914, Milreis	1916, Milreis	1917, Milreis
Coal.....	27	27	76	114
Briquets.....	34	31	77	93
Coke.....	37	34	133	194
Mineral fuel oil.....	66	43	57	91
Bitumen.....	115	140	272	299

Only a small per cent. of the enormous deficit of 1,600,000 tons shown in the 1917 imports as compared with the 1913 imports has been supplied by the increased production of native fuel. Obviously, there is no possible means of determining this per cent., but the following paragraphs at least give some idea of the fuel now being produced in Brazil.

#### GOVERNMENT ENCOURAGES USE OF NATIVE COAL

The Federal Government is anxious to encourage the production of native coal and has agreed to give it preference whenever possible, considering its prices and quality. Aid is to be given in the construction of railroads for transportation purposes and Government-owned ships are to carry native coal, coke, pitch and the pyrites and residue from which sulphur may be made at the lowest possible rates. A Federal decree of Mar. 30, 1918, authorizes the making of loans to coal-mining companies under certain imposed conditions.

A detailed analysis of tests made in the United States and Germany from samples of Brazilian coal is included in an article entitled "Coals of Brazil," by I. C. White, published in *Proceedings* of the Second Pan American Scientific Congress, Volume VIII (Washington, 1917). The Santa Catherina and Rio Grande do Sul coal averages about 35 per cent. ash, of which approximately 6 per cent. is sulphur in the form of nuggets of iron pyrites. By crushing and washing operations this ash may be reduced to about 14 per cent. and the sulphur to six-tenths of 1 per cent. in perhaps 33 per cent. of this coal, which may then be successfully briquetted. In an additional 42 per cent. the ash may be reduced to about 25 per cent. and the excess sulphur eliminated, thus yielding a fair grade of slack. From the remaining 25 per cent. of waste material the iron pyrites may be utilized for the manufacture of sulphuric acid as a byproduct.

The following table, included in Mr. White's article, "Coals of Brazil," gives the results of the analyses of 21 samples of Brazilian coal collected by the commission in the field. The samples selected include varieties of

coal found in the fields of Rio Grande do Sul, Santa Catherina and Parana:

Sample No.	Mois- ture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Phos- phorus	B.t.u.
1.....	1.64	14.25	38.17	54.94	3.05	0.019	8,731
2.....	1.25	19.46	39.59	39.42	5.40	0.019	10,083
3.....	1.24	19.98	44.34	34.44	3.60	0.018	10,296
4.....	1.05	19.17	35.45	44.33	3.34	0.015	9,351
5.....	0.79	17.50	32.55	49.16	5.49	0.019	8,281
6.....	1.18	17.45	33.08	48.29	2.68	0.021	8,483
7.....	1.34	25.76	38.87	34.03	12.99	0.019	9,893
8.....	1.44	24.84	35.34	38.38	10.49	0.018	9,599
9.....	1.02	25.22	38.98	34.78	2.28	0.015	10,420
10.....	1.01	15.80	50.94	32.25	11.42	0.011	9,862
11.....	1.21	26.00	47.88	24.88	6.41	0.020	11,970
12.....	1.06	7.64	54.63	36.67	1.58	0.030	9,397
13.....	5.34	29.68	38.71	26.23	3.90	0.025	9,692
14.....	0.46	25.73	41.27	32.54	8.90	0.023	10,157
15.....	3.43	27.28	37.52	31.77	12.96	0.053	10,095
16.....	4.87	27.89	44.20	23.04	0.60	0.014	11,117
17.....	6.05	29.09	41.33	23.53	4.00	0.017	10,715
18.....	2.62	29.54	38.62	29.22	11.80	0.012	10,420
19.....	2.40	32.95	43.86	20.79	8.66	0.020	10,808
20.....	7.68	17.62	48.94	25.76	3.14	0.002	8,098
21.....	2.37	15.83	58.66	23.14	7.95	0.000	10,711

Analyses of briquets made from the purified Brazilian coal show that while their fuel value is slightly inferior to that of the best grade (Crown) Cardiff briquets, it is equal or even superior to that of the Anchor brand, which is extensively used in Brazil.

The coal fields now being exploited are located in the Jacuhy River Valley, in Rio Grande do Sul, and in the Tubarao district in Santa Catherina. The most important mine in Brazil is located at Sao Jeronymo, about 20 kilometers south of the Jacuhy River, near Porto Alegre. This mine is reported to be owned by Dr. Luis Beten Paes Leme, a Brazilian engineer, and is operated by the Sao Jeronymo Mines and Railway Co. The output is carried down to the river by the company's privately owned railroad and is marketed from Porto Alegre, at the mouth of the river, from Pelotas and from Rio Grande do Sul. Two shafts are now being worked, with a total average daily production of about 650 tons, and a third shaft is being sunk, which will probably increase the daily production to between 1000 and 1200 tons. Over 40,000 tons were shipped to Rio de Janeiro during the three months ending July 15, 1918. The product from this mine is a deep-mined coal, high in volatile matter, and supplies Pelotas with good gas and salable coke.

In March of the present year Sao Jeronymo coal was selling for 60 milreis (about \$15) per ton at Pelotas and at the port of Rio Grande do Sul. A government loan amounting to \$325,000 American currency was recently made to this company, the security being a mortgage on the property of the company.

An analysis of some 20-odd tons of the Sao Jeronymo coal was made by the United States Geological Survey, with the following results: Moisture, 11.52 per cent.; volatile combustible, 26.75; fixed carbon, 40; ash, 21.93. Tests were made in the manufacture of producer gas for the gas engine and these were said to show that the fuel would develop more horsepower per pound of coal than could be obtained by the best grades of Pocahontas or New River fuel when used in connection with the steam engine.

Near the head of the Jacuhy River, in the northern part of Rio Grande do Sul, a large mine is being worked by the Jacuhy Co. This mine is understood to be partially owned by the government, which is aiding in its development with loans and is building 60 kilometers of railway line to connect it with the River Jacuhy. A consular report states that this mine had reached a depth of 60 meters in January of the present year. By

July the production was expected to be between 6000 and 12,000 tons per month, and these amounts were to be increased by the end of the year.

In addition to these two large mines now being worked in Rio Grande do Sul operations are being initiated in the Jaguara River Valley, in the southern part of the state, near Rio Negro, Candiota and Santa Rosa. This coal is of the surface variety and is poorer quality than the Sao Jeronymo product. It sells for about 15 to 20 milreis (about \$3.75 to \$5) per ton at the place of extraction. Abundant evidence of favorable outcroppings in the Jacuhy Valley indicates deposits besides those now being developed.

The chief coal deposits of the State of Santa Catharina are located in four river valleys situated near the coast in the southern corner of the state. A short line, part of the Sao Paulo-Rio Grande system, runs inland from the port of Imbituba and Laguna to Minas, or Lauro Muller Station, as it is now called, and the Government has contracted with the company for the construction of two additional branches to serve the coal mines of this region. One of these branches is to extend from the Tubarao River south 80 kilometers to Arangua and the second from a convenient point on the Parana-panema branch through Barra Bonita to the coal mines at Rio do Peixe.

The firm of Lage Irmaos, which operated in the Tubarao district, is reported to be producing from 60 to 70 tons daily and is desirous of developing its properties further. At present the company is hampered by lack of rails for railroad construction and is transporting its output by oxen. With sufficient railway facilities, it is reported the output could be increased to between 300 and 400 tons per day. The Barra Bonita Mining Co. was organized June 12, 1918, under the laws of Brazil, with a capital of 2,800 contos of reis (about \$700,000), represented by 14,000 shares of 200 milreis each (about \$50), all of which has been fully paid up. The majority of the stock is owned by the Federal Real Estate and Mortgage Company.

The Companhia Industrial de Gamadarella, a corporation with headquarters at Rio de Janeiro, has just been incorporated for the purpose of exploiting deposits of coal, iron, manganese, and other minerals in the "Gamadarella" property in the municipality of Santa Barbara, State of Minas Geraes. The company is incorporated for 3000 contos (\$750,000), which may be increased to 5000 contos (\$1,250,000). Of the initial capital stock 2500 contos (\$625,000) is represented by property and 500 contos (\$125,000) by cash subscribed. The stockholders are all Brazilians. The Carbonifera Rio-grandense Companhia has received Government loans amounting to \$375,000. No definite information concerning this company's operations is available.

To enter a mine after a disaster the compartment of the shaft that can be quickest used for descent should be chosen, but the choice of a compartment will be governed by the facilities at hand for lowering and hoisting. If an auxiliary hoisting engine is in place, much time may be saved by employing it. A crown pulley or sheave wheel may have to be placed above the shaft. The pulley should have a diameter at least 30 times that of the rope or cable used.

## Legal Department

**INJURY TO TIMBERMAN**—Plaintiff, a miner of 15 or 16 years' experience, was employed as an independent contractor to drive an air course in defendant's mine. Two weeks later he was injured through a fall of roof while working as an ordinary employee in the same place, under general orders to timber. At the particular place he had sounded the rock just before the accident, and regarded it as safe. On these facts, the Alabama Court of Appeals holds in the case of Thrasher vs. Red Eagle Coal Co., 78 Southern Reporter, 718, that defendant operator was not liable in damages on account of the accident, on the theory of negligence in failing to discover and guard against the defective condition of the roof before ordering plaintiff to work at that point.

**TERMINATION OF MINING LEASES**—Plaintiff sued to recover \$1000, as a minimum annual royalty under an Iowa coal-mining lease. Defendant denied liability on the ground that plaintiff's right to royalty had ceased under the terms of the contract, which was to run for twenty years, unless the coal should be sooner removed; asserting that all minable coal had been removed and the royalty thereon paid prior to the term for which the plaintiff sued. Deciding the case in favor of plaintiff lessor, the Iowa Supreme Court holds that the defense failed because defendant failed to prove a surrender of the lease with appropriate notice to the lessor of intention to surrender on the ground that all the minable coal had been removed—a controverted fact. The court said: "As long as the lessee held any right under such lease it operated as a continuing incumbrance upon the property of the lessor. It also saved to the lessee the speculative chances of the future and deprived the lessor thereof accordingly. It would seem therefore elementary justice that as long as the lessee claimed any of the benefit of the lease it should be subject to the burden. On its face the lease was valid and binding upon both parties until one or the other should elect to terminate it according to its terms. If the lessee desired absolution from further payment of the minimum royalty it fairly devolved upon it to take an irrevocable position to that end and to so notify the lessor. An acceptance by the lessor would indisputably terminate the lease. A refusal by the lessor would make an issue which could be litigated if necessary." (Fisher vs. Maple Block Coal Co., 168 Northwestern Reporter, 110.)

**ALABAMA VENTILATION LAW INTERPRETED**—In an action for death of a miner due to an explosion of gas in an Alabama mine—Segrest vs. Roden Coal Co., 78 Southern Reporter, 756—the Alabama Supreme Court lately applied the statute of that state, enacted in 1911 and providing that the minimum amount of air to be supplied to a mine shall be 100 cu.ft. per minute per man and 500 cu.ft. per mule or horse. Holding that this statute is designed to protect miners against dangers incident to both noxious and explosive gas, and requires gas to be so diluted as to render it harmless, the court said: "We still think that it was the intent of the Legislature to protect the miner from the danger of noxious and explosive gases generated in the mine, and that this is a non-delegable duty. . . . Had the Legislature provided merely the supplying of a certain amount of air, instead of requiring that the gas be diluted, carried off, and rendered harmless, the mine owner would, no doubt, meet the statutory requirement by supplying the requisite amount. But this was not done, and the amount of air provided is a legislative ascertainment that nothing short of the amount of air so prescribed will accomplish the purpose. The result is the law requires the mine owner, or superintendent, to see that all noxious and explosive gases generated in the mine are so diluted or carried out as to render the same harmless, and that nothing less than air to the extent of 100 cu.ft. per man per minute and 500 cu.ft. for mule or horse will accomplish the purpose."

## Boiler-Scale Prevention

Illinois recently had a "Scale Prevention Week." In every plant scale prevention may be studied with profit. The following open letter from the Fuel Conservation Engineer of the United States Fuel Administration presents the subject well

**T**HE importance of this subject can be appreciated better when it is realized that no boiler is without scale and that all scale results in fuel loss. Exceptions to this rule are so few as to be negligible.

The very fact that it is necessary to use a tube cleaner or turbine is sufficient evidence to prove that there is scale in your boiler. It makes no difference whether the boilers are turbined once a week or once a year, the average thickness of scale is equal to one-half the thickness at the time of removal. Another thing that must not be overlooked is that the only proper place to remove the scale-forming elements is before the water enters the boiler. This is easily done and is the economical thing to do.

Careful and extensive experimentation in this matter has been conducted by Professor Schmidt, at the University of Illinois. Table I is based on the results of his researches.

TABLE I. LOSS OF EFFICIENCY FROM SCALE

Character of Scale	Thickness, In.	Composition	Loss of Eff., Per Cent.
Hard	1/50	Mostly carbonate	5.4
Soft	1/32	Mostly carbonate	7.2
Hard	1/32	Mostly carbonate	8.5
Soft	1/25	Mostly carbonate	8.0
Hard	1/25	Mostly sulphate	9.3
Hard	1/20	Mostly sulphate	11.1
Soft	1/16	Mostly sulphate	10.8
Soft	1/16	Mostly carbonate	11.0
Soft	1/16	Mostly carbonate	12.4
Hard	1/16	Mostly carbonate	12.6
Soft	1/11	Mostly carbonate	15.0
Hard	1/9	Mostly sulphate	15.9

Do not be content with the thought that you are having no trouble with the scale. You will have no trouble only when you have no scale. Why wait until you have bagged the boiler, burned out the tubes or wasted a lot of coal before taking action in this matter? Impress upon your memory the fact that the first thin layer of scale is the most injurious. Stated somewhat more scientifically, the rule is that the insulating effect of scale varies as the square root of its thickness. Thus, the insulating effect of scale of thicknesses proportional to

4, 9 and 16 is in the ratio between 2, 3 and 4. To give this matter point and talk in terms of coal, Table II is given.

TABLE II. COAL WASTED BY SCALE

Average Thickness of Scale, In.	Coal Wasted from Every Ton Fired, Lb.
1/50	100
1/32	140
1/25	180
1/20	200
1/16	220
1/11	300
1/9	320

The use of boiler compounds is unquestionably better than no treatment at all, but it seldom, if ever, accomplishes really satisfactory results. If the compound is a chemical and reacts with the scale-forming material in the water, it can only change this material to something else, which is commonly known as "sludge." When this forms it is deposited on heating surfaces of the boiler as a soft mud-like substance which is not scale, but which has an insulating effect and which, if excessive, may actually result in the plates of the boiler being burned. To avoid the sludge accumulating in excessive quantity the boiler is blown down frequently, which causes a direct loss of heat and waste of coal.

It will be observed from the foregoing that no middle ground is taken in this matter. There is only one right condition and that is perfect cleanliness. If it is thought that there is an objection to properly softening the feed water before pumping it into the boilers, due to the cost of the installation necessary, look over Table II and figure out what it costs now per year with the present water and its consequent scale. In all probability it will be found that the cost of proper water treatment would be paid for within two years, including the cost of operation. Water as pure as that in Lake Michigan comes in this class.

In conclusion, remember that it is possible to so purify the water that no scale will form in the boilers.

# British Mine Accidents and Their Causes

## SPECIAL CORRESPONDENCE

**SYNOPSIS**—*This article is an analysis and commentary on the report of the mine inspectors of the United Kingdom. In Britain, as elsewhere, the majority of fatalities arise from falls of roof and top rock; some result from falling coal, some from explosives, explosions and other causes. Downright carelessness is the source of not a few fatalities.*

**A**T THE mines in the United Kingdom 1,023,400 persons were employed in the year 1917. The coal raised amounted to 248,473,119 long tons and there were 1370 deaths from accident. In round numbers this represents a production of 243½ tons per person employed, a death rate of 1.34 per thousand persons, or 5.5 per million tons of coal mined.

Of the deaths 174 occurred in Scotland, 218 in the Northern Division, 335 in the York and North Midland Division, 153 in the Lancashire, North Wales and Ireland Division, 366 in South Wales and 124 in the Midland and Southern Division. Arranged according to cause, 20 deaths were due to explosions of firedamp or coal dust; 724 to falls of ground; 62 to shaft accidents; 408 to miscellaneous underground accidents; 156 to accidents on the surface.

It will be seen that falls of ground were responsible for nearly 53 per cent. of the deaths.

### PROPORTION OF PREVENTABLE ACCIDENTS

Mines Inspector H. Walker (Scotland Division) refers to 21 deaths due to falls of side rib, or face, and expresses the opinion that 11 of them were entirely due to failure to set sprags and rances (props set against face). In this division there were 73 deaths due to falls of roof. The inspector says that five of them could have been prevented by the setting of temporary supports, two by the systematic setting of straps (boards resting on props) and four by a stricter observance of the timbering rules as laid down for the beds in which the accidents occurred. This means that of 94 deaths, 22 or nearly a quarter, were entirely preventable.

Mr. Walker emphasizes the fact that the question of adequate support being given to roof and sides is, after an efficient system has been arranged, one of discipline. Arriving at an efficient system suitable to the conditions existing in any coal bed is the duty of the manager of each mine, aided by the officials.

Having decided upon a system of support the inspector says that models of the method should be made and set up on the surface. Sketches he considers of little value, but full sized models that a miner could inspect at his leisure would show him exactly the manner in which the supports were to be set and advanced. However perfect the system, it is of small value unless compliance with it is rigidly enforced and this is where the necessity for strict discipline arises.

It would be thought that the man who was likely to be killed or injured would be the person most anxious

to take steps to prevent an accident. A miner, however, will take risks and this factor must be taken into account. Inspection should be made at frequent intervals and visits to the various parts of the mine assigned to him should not be carried out by the official or any routine plan. Mr. Walker urges that uncertainty as to the time of the official's visit would prove beneficial and would result in a saving of life and limb where the system of support is rigidly enforced.

The inspector of the Northern Division, J. R. R. Wilson, regrets to have to repeat year after year that a large number of accidents should never have occurred. So long as men are reckless or thoughtless fatalities are bound to happen. In this division (Durham, Northumberland, etc.) accidents caused the loss of 218 lives. Of these the inspector says 93, a serious proportion, exceeding 42 per cent., might reasonably have been avoided.

Mr. Wilson reports: "There is a tendency to omit setting temporary supports, particularly when withdrawing timber. In this connection too there are frequent errors of judgment; and men seem to prefer when taking out timber to use a pick or an ax rather than a safety appliance."

Mr. Wilson does not hold the men solely blamable for this condition, for better discipline and supervision and a keener appreciation of the value of safety appliances by officials would certainly tend to reduce the number of accidents.

Accidents from falls of ground are commented upon by other British mine inspectors. J. Dyer Lewis (South Wales Division) declares that the only hope of reducing the number of accidents lies in the constant vigilance of officials and workmen. Mr. W. Walker (Midland and Southern Division) directs the attention of all concerned in the working of mines to the advantage of setting foresets or temporary supports wherever possible, until there is room for the permanent timber. He also impresses upon officials and workmen alike the necessity for stricter observance of timbering rules, as inspectors when visiting the collieries have frequently to call attention to places where the maximum prescribed distances have been exceeded.

### EXCLUSIVE USE OF SAFETY LAMPS ADVOCATED

In Scotland accidents due to accumulations of inflammable gas are numerous. Mr. H. Walker says that so long as they continue the ventilation of the mines cannot be considered as satisfactory. He advocates the universal use of safety lamps for, in his opinion, after their introduction a considerable proportion of such explosions would cease to occur. In Scotland miners and employers are much averse to the use of safety lamps. Apparently the opposition to them is so strong that it seems unlikely that they will be removed. The inspector says, therefore, that if naked lights are to continue in use adequate precautions must be taken. He would regard all mines as being equally dangerous and take steps to ventilate all holes in the roof, the face of all brushings, the high side of fast places; he would

use no lamps or lights other than safety lamps, when a new seam or district of a seam is being opened or when working near a whin or near a fault in the strata. Such precautions are simple, and the hope is expressed that the employers and also the miners who are liable to be injured should an explosion occur, will see that they are carried out.

In recent years more attention has been paid to ventilation and Mr. Wilson finds that frequent suggestions coupled with a readiness to take air samples for analysis have their effect upon the most backward officials. In such a district as South Wales, where large quantities of firedamp are daily drawn from the mines, Inspector Lewis says it is most essential that the volume of air in circulation should be sufficient to dilute and render the firedamp harmless.

The coal-dust problem is a subject of discussion wherever coal is extracted. In his report Mr. H. Walker points out that dry-stone walls or packs along the side of roadways form ready places for the settling of coal-dust. A liberal application from time to time of inert dust to the surfaces and crevices of such walls would, he says, prevent the settlement of more dust on and in them and at the same time furnish a guard against the danger latent in the dust already deposited there.

In Great Britain the local Mines Act requires that arrangements shall be made to prevent as far as possible the dust from the screen from entering the down-cast shaft, and at all newly opened mines the preparation equipment must not be situated within 80 yd. of the shaft. The floor, roof and sides of the roads have to be systematically cleaned to prevent as far as possible accumulations of coal dust while systematic steps, such as watering, must be taken to prevent explosions of coal dust from occurring or, if they occur, from being carried along the roads. A precaution that came into operation on Jan. 1, 1917, requires that the cars shall be so constructed and maintained as to prevent, as far as practicable, coal dust from escaping through their sides, ends or floor.

The Lancashire inspector, A. D. Nicholson, refers to the difficulty experienced in keeping iron cars dust-proof. This is causing some collieries to return to slightly improved types of wooden cars. He observes, however, that in deep and therefore warm mines this type of car is also difficult to keep dustproof.

In the Scotland report reference is made to five fatal firedamp explosions in which eight persons lost their lives. In connection with the most serious of these accidents the inspector says that "had obvious precautions been taken it would not have occurred." In the second case the fireboss was carrying both a naked light and a safety lamp when making an inspection. In the third and fourth cases the miners had gone into places which were fenced off. In the fifth case a brattice had been broken down by a fall, and two men were allowed to continue working before the brattice was rehung.

Commenting upon accidents with explosives, Inspector H. Walker says one course to adopt if a shot is not definitely heard to explode within a reasonable time is to regard it as a misfire and treat it accordingly. Another would be not to allow any person to have explosives in more than one hole at the same time when fuse is the medium through which the charge is fired. The inspector, in view of the numerous accidents, goes

so far as to recommend that serious consideration be given to the prohibition of the use of fuse.

A man had his hip pierced by a nail and died. Inspector H. Walker says that too little attention is paid underground to the recovery of nails of all descriptions.

The use of glass bottles underground should be forbidden unless they are protected by suitable metal cases. In almost any mine, says the inspector, one can see broken bottles and when it is remembered that much traveling is done on hands and knees the danger is obvious. When nails are allowed to project from pieces of wood and when broken glass is strewn along the roads horses are subjected to serious hazards.

Many officials and workmen have been convicted of violation of the law. Among the more common contraventions of rules are those relating to matches and smoking.

Mr. Walker suggests that at each mine a committee of officials and workmen should be appointed. To it should be placed communicated details of every accident which occurs at the mine. It should have power to make recommendations for the prevention of similar accidents. Objection would doubtless be raised to the setting up of such committees on the ground that they would be likely to overstep their functions. If a good feeling is maintained and the object of their appointment is kept before them, the committees should do much to eliminate accidents. Perhaps some scheme of referring recommendations to an arbiter before they are put into effect would serve to make the operation of these committees more harmonious and beneficial.

### Development of Lignite Mines in Greece Brought About by the War

With the stoppage of coal importation into Greece, it became absolutely necessary for that country to find some substitute, and the lignite mines at Kymi, Psachna, Aliveri and Oropes were exploited. These deposits were hitherto known, but inasmuch as the best Welsh and English coal could be obtained before the war as cheaply in Piræus as in the United States, it was not commercially practicable to work them. This unusual situation was due to the fact that steamers bound for Black Sea ports for grain brought out coal as ballast, discharging at Piræus.

More than 100,000 tons of lignite are said to have been mined from these deposits during 1917. A project is now afoot, which has the hearty approval of the Greek Government, to manufacture this lignite into briquets, which for many purposes will be equal, it is thought, to coal. It is hoped that through this means it may become possible to restore gas to Athens and Piræus. For cooking and heating purposes wood must now be used at very high prices, if one is unable to afford the charcoal which is vended from house to house in strictly limited amounts.

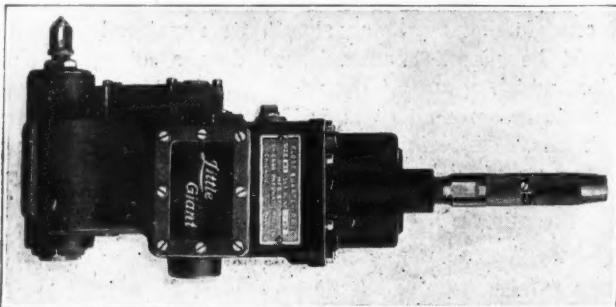
### Erratum

In the issue of *Coal Age* for Dec. 12, 1918, page 1078, the sentence in the second column and seventh line below the small table reads: "The result was 35.86 per cent., or approximately 37 per cent. ash." Obviously this should have read "approximately 36 per cent. ash."

## NEW APPARATUS AND EQUIPMENT

### Little Giant Corner Drills

The Little Giant corner or close quarter drill, manufactured by the Chicago Pneumatic Tool Co., of Chicago, Ill., has been designed to overcome the objection arising from the intermittent action of ratchet levers in the rotation of the spindle. In this drill steady, uninterrupted revolution of the drill spindle is accomplished by means of a train of gears, thus retaining all the advantages of the ratchet type and permitting the drill



LITTLE GIANT CLOSE-QUARTER DRILL

to be used in the same narrow space, or within  $1\frac{7}{8}$  in. of the end wall or corner.

In this drill the power of the motor is transmitted to the spindle without vibration, resulting in a steady, even pull with minimum wear and tear on the machine itself.

In the stub tooth gears which are employed, the root of the gear tooth is much thicker than in the standard involute tooth. The tooth itself is shorter, hence it will withstand a harder pull. The special alloy steel used in these gears makes them highly resistant to wear.

### Removable Truck Safety Switchboard Units

The removable truck-type safety switchboard units here shown are eminently fitted for use in electric power plants. They can be obtained for the control of generator, motor and feeder circuits, and are particularly adapted to plants where electrical distribution is made from a centrally located distribution center. The construction is such that extensions can be readily effected or the units moved to other locations to meet new or changed conditions. All current-carrying parts are inclosed, and the opportunity for an operator to come in contact with the circuit is practically eliminated.

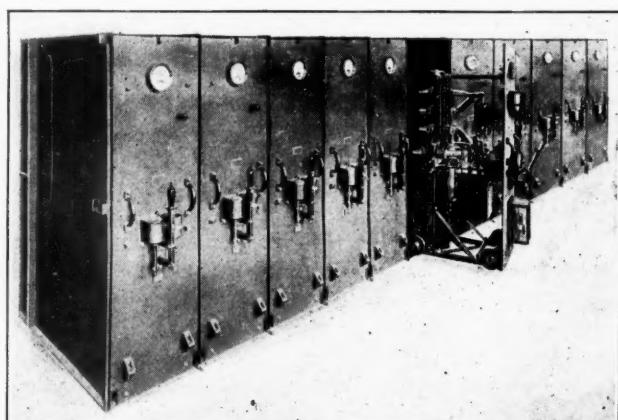
A spare removable unit can be used to reduce the time of shutdown for inspection or repair. Busbars need not be killed, disconnecting switches need not be opened, leads and small wiring are not disturbed. The oil switches, buses and all live parts are placed in compartments. This tends to reduce fire hazard and limits disturbances to a single point.

The stationary member of the removable truck switchboard carries current and potential buses with their disconnecting switch studs and barriers between the

current studs to prevent accidental contact by any one who enters the compartment. The rear end of the current disconnecting switch studs runs to buses and incoming or outgoing leads; the potential bus wires to small contact studs near the top of the compartment. The side walls are provided with hand holes, so that the busbars and bus wires can be continued from unit to unit. On the exposed walls of the end units these openings can be closed by removable covers. Access to the rear of a compartment can be had by means of hinged sheet-steel doors provided with means for padlocking in the closed position.

The removable truck is mounted on wheels. The forepart carries a sheet-steel panel on which is mounted the instruments, meters, oil switches or other appliances usually employed on the ordinary slate switchboard panel. The current transformers are mounted on steel brackets back of the instrument panel. The rear of the truck carries the movable parts of the disconnecting switches, the potential transformers and small wire accessories. To center the truck and to assist in placing it in or removing it from a compartment, rails fastened to the side of the compartments are furnished. The oil switches, instruments, meters, transformers, etc., are removed from the installation by wheeling out the truck.

In order to remove or replace a switch unit, the oil switch must be opened and therefore the load disconnected. This is provided for by an interlock attached to the oil switch operating toggle, which engages cast lugs on the walls of the stationary unit. With the oil



REMOVABLE TRUCK SWITCHBOARD UNITS

switch closed it is impossible to remove or insert the truck. The value of this feature is self-evident.

These panels are being regularly manufactured in a variety of styles and capacities and vary in capacity from the smallest up to and including 1200 amp. They are designed to operate at voltages up to 15,000. In the larger sizes the housings are usually of reinforced concrete, and all capacities are designed for use with either solenoid or manually-operated oil circuit breakers. These units are made by the General Electric Co.

## New Type of Mine Motor

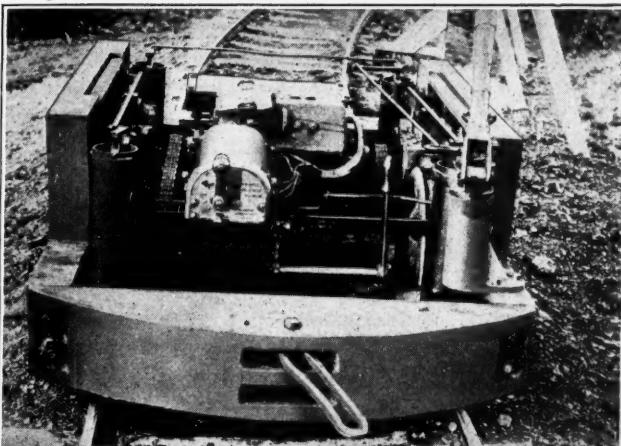
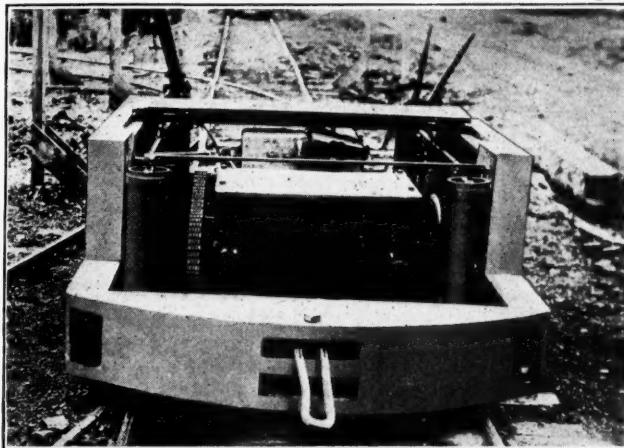
By D. I. WHEELER  
Cleveland, Ohio

A novel type of coal-hauling motor has been developed and is now being started toward quantity production by the Nelsonville Electric Co., of Nelsonville, Ohio. The striking feature of this locomotive, which is shown in the accompanying photographs, is its extreme lowness, the total height over the rails, exclusive of trolley, being only 29½ in. The same dimension as to height is to be maintained on all motors of from three to ten tons, the point being, of course, that this tractor can be used in many low-vein drifts where a larger type could not gain access. The hauling capacity is equal to or greater than that of more cumbersome machines, which are often useless where the headroom is low.

In eliminating height, the Nelsonville people have gained in simplicity of construction and efficiency of operation. The motive power consists of an especially designed Western Electric type motor built by the General Electric Co. The maximum speed of this motor is 600 r.p.m. It is operated by a compact G. E. controller mounted horizontally on the frame. The motor is mounted exactly over the center of the wheelbase and the power is transmitted directly to each axle by a symmetrical arrangement of two Morse rocker joint silent chain drives, one being at each end of the armature shaft. The advantage of this type of transmission is that a driving efficiency of 99 per cent. is attained and the noise and friction of gear trains are eliminated.

This arrangement also cuts down the number of parts. The machine is therefore subject to much less trouble, and is more durable. The wheels are 20 in. in diameter, with a wheelbase of about 24 in. This short wheelbase further carries out the idea of reducing room necessary for operation in small rooms or short turns. The maximum speed of the machine is governed by a three to one reduction through the chain transmission, and is between 11 and 12 miles per hour.

In addition to the advantages named above, other distinguishing features of this locomotive are the ex-



TWO VIEWS OF MOTOR MOUNTED ON MINE HAULING CAR  
tremely simple oiling device for the axle, by means of which oil and waste can be easily replaced; accessibility of working parts; and a simple and easily operated braking device.

It would seem that this new locomotive has such merit that the manufacturer is justified in the extensive plans which are rapidly being carried out for the production of these low-type motors on a large scale.



NOTE THE EXTREME LOWNESS OF THIS NEW TYPE OF COAL-HAULING MOTOR



## United States Had Huge Mineral Output in 1917

The value of the minerals produced in the United States in 1917, according to the United States Geological Survey, Department of the Interior, was \$5,010,948,000, an increase of \$1,496,976,000, or about 43 per cent. over the former record—\$3,513,972,000—established in 1916. The blast-furnace products (pig iron and ferroalloys), copper, coal and petroleum contributed 74 per cent. of the total value of minerals produced and 88 per cent. of the increase in 1917.

The metals established a new record in 1917, being valued at nearly \$2,092,000,000 and representing 42 per cent. of the total value of the mineral product. They showed an increase of about \$471,316,000, or 29 per cent. over the \$1,620,508,000 reported for 1916. The blast-furnace products contributed nearly 90 per cent. of the total increase. Increases were also made in the value of aluminum, copper, lead and silver, but decreases were recorded in the value of gold and zinc.

The value of the nonmetallic products in 1917 was 58 per cent. of the value of all minerals produced, increasing \$1,010,459,000, or nearly 54 per cent., from the former record of \$1,878,464,000 in 1916 to \$2,888,923,000 in 1917. Of this total increase coal alone represented nearly 66 per cent., and coal and petroleum combined contributed about 85 per cent.

## Fuel Administration's Work Slowing Up

Visitors to the Fuel Administration these days are reminded that the war is over. The building which only a few weeks ago was a veritable beehive is strangely quiet. Half of the rooms apparently are not in use. The mildness of the winter and the unimportance of production and transportation problems, as compared with those of a year ago, have been important factors in the falling off of the administration's work. Even anthracite seems to be overcoming its difficulties, and the men who were being held to handle that situation have little to do.

While there is no shortage of bituminous coal reported from any point, it is the intention of the distributing section to continue work through the winter as distribution problems continue to arise in large number.

It is stated that in the United States there are known deposits of lignite aggregating 150,000 square miles in extent, containing about 100 billion tons of this fuel.

## Railroad Administration Would Abolish Garfield Coal Prices

A determined effort is being made by the Railroad Administration, it is understood, to secure the abandonment of the coal price schedule. While most of the officials at the Fuel Administration believe it would be a great mistake to abandon prices before the end of the coal year, there is uncertainty as to what Dr. Garfield will do in this regard. Dr. Garfield has the reputation of listening patiently to all that his lieutenants have to say and then going ahead<sup>r</sup> according to his own ideas. As it is possible that he may handle the price schedule in that way, few would be surprised to see the prices abandoned Feb. 1, and some think that such action may be taken even as early as Jan. 1. No explanation is forthcoming, however, as to how justice would be done to those whom the Government has forced to stock up on inferior coal, which would be a drug in their bins.

## Upholds Rates on Pea and Slack

Rates on pea and slack coal from the Walsenburg district, Colorado, to points in Kansas, on the Atchison, Topeka and Santa Fe Railway, have been upheld by the Interstate Commerce Commission. The rates were attacked by the Alliance Coal and Coke Company.

## Warrior River Coal Transportation

An official statement regarding the Warrior River barge line which will engage entirely in the transportation of coal from the Alabama fields to tidewater at New Orleans and Mobile, was issued Dec. 14 by the Railroad Administration. It reads as follows:

"Plans have been completed for providing new equipment under the jurisdiction of the United States Railroad Administration for service on the Black Warrior River.

"There are two distinct services: One from Cordova (near Birmingham, Ala.) to New Orleans, and the other from Cordova to Mobile, Ala. The Cordova-New Orleans route is partly river and partly sheltered Gulf operation. To provide for the New Orleans service self-propelled steel barges 275 ft. long, 49 ft. extreme beam, and 10 ft. depth, with triple expansion engines (2) 400 hp. each, and water tube boilers of the express type, are proposed. Such boats will carry 1800 tons of coal on a 7½ ft. draft, and the proposed design contemplates a cubic capacity of about 500 tons for merchandise freight. The estimated cost of such a self-propelled steel barge is about \$250,000, and in its construction

about 500 tons of steel will be required. Four such vessels, with annual capacity of 175,000 tons, will be provided.

"For the enlarged Mobile service, it is proposed to construct 20 wooden barges of approximately the type now used on the river, and three steel towboats with approximately 400 hp. each. The estimated cost of each towboat is \$160,000 and the 20 wooden barges can be constructed for \$120,000.

"This represents a total expenditure of \$1,600,000 for the Warrior River system to provide an increased annual coal movement of 375,000 tons.

### Lignite Bill Not To Receive Immediate Consideration in House

An effort to bring up the lignite bill in the House for immediate consideration has failed. The rules committee agreed to order its immediate consideration, provided the committee on mines and mining should make a unanimous request to that effect. A single member of the committee on mines and mining refused to concur, thereby making it necessary for the bill to take its regular place, which is far down on the congested calendar.

### Questions Fuel Administrator's Power

An interesting question has been raised by the following resolution, which has been passed by the Senate:

"Resolved, That the fuel administrator for the District of Columbia be directed to inform the Senate what steps he is taking to enforce the order made fixing the maximum charge for putting in or storing coal at 75c. a ton in the District of Columbia, and if no steps are being taken to enforce said order to inform the Senate why this is not being done and by what authority of law was said order issued."

The resolution was introduced by Senator Jones, of Washington. It brought forth the following comment from Senator Reed, of Missouri:

"I have no objection to asking for the information, if it is done in a form which does not appear to involve the sanction of the Senate to this order. The fuel administrator in Washington, of course, has just as much authority to fix the price for putting in coal as he has to fix the price of any man's wages, and it is time that this assumption of arbitrary power should cease everywhere in the United States."

### Praises Volunteers Who Manned Coalers

Certificates of honor have been issued by the Shipping Board to the volunteers who stepped into the breach last spring and made it possible to man the vessels in the New England coal trade. An official statement in regard to the matter is as follows:

When the great German drive of last spring was in full swing, and the war industries of New England were clamoring for coal, in order that clothing and blankets and bullets for the American forces in France might be turned out on schedule, the U. S. Shipping Board called for volunteers to serve in the fireroom and deck crews of the steamers carrying coal from Virginia to New England ports.

Numbers of young men who had entered the Merchant Marine training service with the hope of getting into the

crews of ships going overseas, put their personal wishes aside and volunteered to help man the coalers. It was hard, cold, disagreeable work, but it was done so effectively by these volunteers that records of efficiency were made by the coal-carrying ships, and the New England war industries were enabled to keep their fires and their production up to the limit necessary to maintain an uninterrupted output.

The Shipping Board announces that it has recognized the spirit of patriotic self-sacrifice shown by the Merchant Marine volunteers who manned the coalers in that period of stress, and has ordered that certificates of honor be issued to them. Every man who has served three months on board a New England coaler will get one of these marks of distinction.

### Zone M-2 Has Been Enlarged

Coal produced in the Logan and Kanawha districts may now move to tidewater via the Chesapeake & Ohio R.R. This was made possible by the enlargement of consuming zone M-2. Previous modifications affecting these districts have allowed for westward shipments only.

### Increased Output of Domestic Sizes of Anthracite

Production of prepared sizes of anthracite, during the week ended Dec. 14, exceeded the production of any week since that ended Oct. 5. The output of that character of coal was 1,197,079 tons. Total production for the week of Dec. 14 was 1,923,625 tons, an increase of nearly 7 per cent. over that of the week preceding.

### Coal Loadings Ahead of Last Year

Including the week ended Dec. 14, the loading of coal cars exceeded the performance during the same period of 1917 by 546,766 cars. During the week ended Dec. 14, the number of cars loaded, as well as those during the corresponding week of 1917, are shown as follows:

	1918	1917
Total cars bituminous.....	181,823	147,631
Total cars anthracite.....	36,401	31,656
Total cars lignite.....	4,094	4,653
Grand total all cars coal.....	222,318	183,940

### Brief Washington Notes

Exporters of coal and coke no longer are required to file Form X-6 with the War Trade Board.

Russell Hastings, of Boston, who has been in charge for the Fuel Administration of bituminous coal distribution, as related to public utilities, has resigned.

Lake shipments of cargo coal in 1918 were 28,153,317 tons, according to the Geological Survey. The tonnage is the greatest ever carried in one season.

One of the war accomplishments of the Bureau of Mines, which will be a peace-time asset to the country, is a change in the design of marine boilers, so that the coal heretofore necessary to propel the ships for six miles is now sufficient to carry them seven miles.

Coal exported during the fiscal year ended June 30, totaled 25,894,166 tons. The growth in the amount of coal exported is shown by comparing it with the exports of the corresponding period ended June 30, 1914, when exports were 19,664,080 tons.

# THE LABOR SITUATION

EDITED BY R. DAWSON HALL

## General Labor Review

The recent United Mine Workers election is the principal matter of interest. Rumors have spread that John Walker of Illinois has carried the anthracite field against Frank J. Hayes, the past president of the United Mine Workers. Ellis Searles, the editor of the *United Mine Workers' Journal*, recently stated that Frank J. Hayes had a majority of more than 40,000 votes and so would be reelected by a majority of 50,000 to 60,000.

An announcement has been made at the office of District No. 1, United Mine Workers of America, that John T. Dempsey, former president of the district since 1911, who, two months ago, resigned has been appointed as a representative of the international body throughout the anthracite region. His work will be the organization of new locals and the building up of those now in existence, and his new office will take him into his old district, No. 1, as well as Nos. 7 and 9.

### WANT THEM TO WORK EVERY DAY BUT CHRISTMAS

The Fuel Administration on Dec. 21 issued an appeal to the anthracite mine workers to work industriously every week-day this week except Christmas Day, so as to make amends for the loss of output naturally arising from the outbreak of influenza and the time lost for jollification over the armistice.

For the first time Mexicans have been imported into the Hazleton region. Their introduction into the northern anthracite field at Carbondale made a great deal of trouble. A similar complaint to that made in the northern field will probably be made at Hazleton. On Dec. 17 the George B. Markle Coal Co., unable to maintain production, brought 100 Mexican laborers into the district to work in its mines.

From West Virginia comes the information that the coal operators of northern West Virginia and the United Mine Workers of the same area reached an agreement Tuesday week, Dec. 17, which is said to be satisfactory to all concerned. It has been ratified by the directors of the Northern West Virginia Coal Operators' Association.

### FAIRMONTERS MAKE SETTLEMENT OF DIFFERENCES

At the first conference of the operating committee of the association the following representatives of operating concerns were present: A. C. Beeson, chairman, C. H. Tarleton, J. M. Wolfe, Brooks Fleming, Jr., J. A. Clark, Jr., of Fairmont; C. J. Ryan, of Hepzibah; Everett Drennen, of Elkins; J. M. Orr, of Clarksburg; A. L. Hamilton, of Pittsburgh, and L. J. Sandridge, of Meriden. The representatives of the United Mine Workers of America were: Robert H. Harlin, an international representative, of Indianapolis; C. F. Kenney and Fred Mooney, of Charleston, president and secretary respectively of District No. 17; Francis Drumm and William J. Trickett, of Cumberland, president and secretary respectively of District No. 16; Joe Loftis, of Cumberland, and Sam Ballentyne, of Albion, Iowa, members of the international board. The agreement follows:

Memorandum of agreement entered into at Fairmont, W. Va., Dec. 17, 1918, by the coal operators of the territory covered by the Northern West Virginia Coal Operators' Association and by the United Mine Workers of America of District No. 17.

It is specifically and mutually agreed that the agreement entered into by the operators and the United Mine Workers of America at Fairmont on Aug. 31, 1918, shall be the basic thick-seam agreement for the territory embraced by the Northern West Virginia Coal Operators' Association; and that the agreement entered into by the operators and the United Mine Workers of America at Fairmont on Sept.

7, 1918, shall be the basic thin-seam agreement for the same territory, and further that no other agreement shall be agreed to by the organization and any individual operator in the above specified territory during the period of the above-mentioned agreements.

At mines where the mining or day-wage rates prevailing are higher than those prescribed in these present basic scales, such rates shall exist during the period of the present basic agreement, unless both operator and miners agree to a change in such rates in harmony with basic rates.

It is further agreed that at the termination of the present agreement, a basic uniform scale for the thick and thin seams respectively, and for day rates will be adopted for all operations in the above-specified districts.

### MONTHLY MEN GET THEIR \$1.40 A DAY RISE

The 2000 employees of the New River Co. reached an understanding with that concern on Dec. 12 and, in consequence, the strike which has interfered with production since Dec. 3 was declared off and the men returned to work.

The terms of the agreement reached may be summarized as follows:

1. Monthly men, except those exempted by the United States Fuel Administration, shall be paid the \$1.40 per day increase on the basis of 25 days per month, when employed full time, and the claim for the difference between 25 and 30 days shall be subject to review and to the decision of a special umpire.

2. The decision of the special umpire with reference to trappers' wages shall be accepted.

3. The decision of the special umpire on Sam Oliver's case shall be accepted as decided and shall apply to men employed previous to Apr. 16, 1917.

4. The car-pushing case shall be reopened by joint request of the operators and members' representatives.

5. Inasmuch as the decision of the special umpire in the 60c. case does not apply to monthly men, it is agreed that any monthly man feeling himself aggrieved in this matter may have his question submitted to the special umpire for decision.

The decision regarding those monthly men, who are not exempted by the United States Fuel Administration is as follows:

"The contention of the miners that the Washington wage advance should be applied to day and monthly men in the New River field is sustained, and all day and monthly men, except mine managers, top and bottom bosses, weigh bosses, firebosses and head mechanics shall be given the increase provided for in the Washington agreement; namely, \$1.40 per day. The coal operators who have received since Nov. 1, 45c. a ton increase in the selling price of their coal for the purpose of absorbing the Washington advance, will be required under this decision to pay all back money due the men affected as herein defined."

### MEN OF ROARING CREEK FIELD GO BACK TO WORK

After being on strike for about 10 days the striking miners of the Roaring Creek field were induced to return to work by John P. White, former international president of the United Mine Workers, who visited the headquarters of District 16 at Cumberland on Dec. 8. White urged the miners to return to work pending an adjustment of their grievances, which had to do with a construction of the terms of the Freeport scale agreement.

Short time in the bituminous mines is a rapidly spreading epidemic. The most recent report of the Geological Survey appears 19 days earlier than the date of our publication and so does not represent the conditions of the date of issue. The percentage of loss of time due to no market had 19 days ago risen to 6.0. The week before it was 5.7. The strike and labor shortage loss had risen to 7.2 per cent., having been 6.1 the week before. Doubtless next week's report, which will cover up to Dec. 14, will show more mines out of work for lack of orders.

# A NEW YEAR'S GREETING



*FATHER TIME:—TAKE THESE BONDS. PART OF THEM WERE LEFT ME BY MY FATHER, 1917, AND PART I HAVE BOUGHT MYSELF. KEEP THEM AND ADD TO THEM, FOR SHOULD YOU NEED A FRIEND YOU COULD NOT FIND A BETTER.*

### Friends and Fellow Workers:

I wish you a Happy New Year! Many Happy New Years, each happier than the one before.

During the past two years we have all been buying Liberty Bonds, so we have something put aside for a rainy day. Let us keep our Government bonds till we really need to use them; at any time we may have sickness at home, or a hunting accident or even a slack run at the mine.

Let us buy more bonds when they are offered to us, or even before a new issue is offered—for bonds of previous issues are always obtainable.

Remember, it is always patriotic to furnish the capital by which necessary and permanent work is done, whether the completed work takes the form of railroads, mines, factories, ships or houses. But the

man with small funds can rarely run the risk that goes with such an investment. Only a well-to-do man can afford to risk his money in that way, trusting to balance his heavy losses by great gains. So when you invest your money, stick to savings stamps and national, state or city bonds, or put your money in banks where you will be sure of both capital and interest.

By such savings you will secure a happy future and growing prosperity year by year. Again wishing you a Happy New Year, I remain,

Yours cordially,

## EDITORIALS

### Railroads Should Deliver Clean Cars

**G**OVERNMENT ownership has one advantage. When the Government runs a plant it can appeal to patriotism to get its behests attended to. It can bring pressure which, applied by any other agency, would be resisted.

The railroads for years have been imposed upon by those shippers who, receiving low-grade material, were indifferent as to whether they unloaded it all or left a percentage in the car. Especially is the temptation strong during the winter, when much of the material is received frozen and men are hard to find.

The shipper would rather leave frozen sand, ashes, gravel, manure, sawdust or low-grade clay in the car than diligently dig it out. The railroad, of course, could see to it that the cars were cleaned did not a fall of snow cover up the floor of the car. Frequently no one knows the condition of the car till the trimmers at the tipple get busy with their shovels and brooms.

Then the cry goes out loud and persistently for the mine foreman: "Shall we clean this car and meanwhile shut down the mine or let it through or even load it up without cleaning?" If cars are badly needed and the railroad pressing for the use of all equipment, then there is a great likelihood that the car will be filled without cleaning or, if too dirty, cleaned at much trouble, delay and expense.

Sometimes several men are busy at such work, the tipple force discovering the offending car long before it is run down under the loading chute, or to some point where the closeness of the tracks makes cleaning impossible. If the car is run below the tipple, the railroad has much trouble switching it out of the train to some place where the local section gang can in its few spare hours find time to clean it out.

Why should not the United States Railroad Administration memorialize the shipper of low-grade material and make him cease his abuse of the rights of the railroad and other shippers? The opportunity to bring the shipper to a better habit and conscience in this matter is right now, when the railroads and the nation are one, and he who inconveniences the one directly defrauds the other.

The railroad itself is often somewhat to blame, for its own men are sometimes careless in unloading cars of ballast and leave much material in the bottom of the car. The exigencies of railroad operation sometimes furnish an insufficient excuse for neglect of this kind.

### Coal May Oust Gasoline for Motor Cars

**O**PERATORS of coal mines can look forward to large changes in the coal industry in a few years. The British *Daily Review of the Foreign Press* gives a brief notice based on an article that appeared in the well-known Swiss paper, the *Schweizerische Bauzeitung*.

Superficially it does not seem to concern the coal operator, headed as it is "Acetylene as a Substitute for Benzol," followed by the statement of Dr. Grossmann, of Zurich, who in 1915 and the year following pointed out that "acetylene might be used as a substitute for benzene (and therefore for gasoline) in driving motor cars."

When we remember that calcium carbide, the recognized source of acetylene, is made by subjecting coke and lime to the high temperature of an electric furnace, we begin dimly to see where the coal industry enters into the problem; for acetylene is, speaking broadly, a byproduct of coal. It may well prove to be an important after-product of the coke output of the byproduct coke oven.

But always it must be remembered, as Dr. Grossmann points out, that acetylene explodes somewhat too rapidly to be a suitable source of power; that alone, and in its mixture with air, it will explode at a pressure of 30 pounds per square inch and that, when the combustion in the motor is imperfect, soot and acid combustion products will rapidly form. To lengthen the period of explosion water, steam, benzene, benzol, gasoline, pitch and naphthalene may be added, but the two first—water and steam—give no energy and will absorb some of the power. The explosibility under pressure can be cured by the introduction of acetone in the storage tank. Of course, the difficulty about inefficient combustion can readily be cured. Acetylene may be either stored in cylinders or generated on the car.

The problem is interesting. At present it seems visionary, but who can deny that coal may conceivably take over most of the work now done by petroleum? Kerosene and paraffin are rapidly losing their character as illuminants. Acetylene, coal gas and electricity are ousting them from their former place as sources of light, all these three illuminants being manufactured with the aid of coal. Maybe the power use of petroleum byproducts will also come to an end, and then little will be left as rôle for petroleum other than to serve as a lubricant; and even that function seems threatened by a substitute made from coal—namely, anthracene oil.

### Tithing America for the World's Benefit

**O**NE OF our contemporaries is urging that as "the productive capacity of the United States is 10 per cent. in excess of its consumption requirements, 10 per cent. of our total production must be sold in foreign markets to provide continuous employment for all our productive agencies." If we are going to sell 10 per cent. more than we buy we must extend credit for that 10 per cent., and as interest will accrue on that credit we must not only give a credit of 10 per cent. of each output yearly, should we supply so much to foreign buyers, but extend a credit also that will allow

the foreigner to pay his interest indebtedness by new credits instead of with goods.

We produce, at present, roughly 40 billion dollars worth of goods yearly. If we send 10 per cent. of our product abroad, that will be four billion dollars of produce per annum. If we will not receive in products either the capital or interest on this impressive sum, how long will it take to pile up a bill which, to pay, will bankrupt the world?

We cannot sell, sell, sell and never buy. We cannot work for the world unless we take our pay in the work of the world. Thoughtless Americans urge on us an independent America that buys nothing. How can such an America be, except it is a self-contained America that not only buys nothing but also sells nothing? The sign of export trade is foreign goods in our market, just as much as it is our goods in a foreign market.

We shall for a while sell Europe more than we buy, because of her present necessities. We shall continue for a few years to add to the indebtedness of the non-American population of the world. Well and good. But the process before long must end. The lender must soon get more than he gives to the borrower or lose at least the interest on his loan.

He who works for the foreigner slaves for the foreigner unless the foreigner pays him with labor and goods for his services. Why are we so keen to ship abroad? That which we can produce with a minimum of labor we can profitably ship; that which it perplexes us to produce, and which the foreigner can manufacture easily, let us buy from him unless we fear there will sooner or later be a war between us. Then it is best not to be dependent in any way on our opponent.

Some day we may be as ready to buy of France as Pennsylvania is willing to buy of New York. What does it profit us to keep up these national lines unless thereby the safety of our homes and our hearths is imperilled?

### Isolated Plant Versus Purchased Power

**R**EAMS OF discussion have been printed on the subject of the relative profit in the purchase or generation of power, all based on conditions as they are. We are going to be bold and discuss them on conditions as they ought to be. Most of the isolated plants are using good coal under their boilers. They ought not to be. The bony coal, pyrite and slack should be used for that purpose, but many plants have no provision for crushing and burning the bone and the pyrite. Many operators have planned the use of fine coal and have been obliged to use the coarser material because the equipment provided would not burn fine coal to the best advantage.

For these reasons the isolated plant at the mine is apt to burn coal which is distinctly superior to that furnished to the central power station.

It should take advantage of the fact that the poorer coal produced at the mine will net the operator little or nothing and can be profitably used to make steam if it is utilized at the point of origin.

If the refuse of the seam is large and is to be used, it must be used at the isolated plant. It will not do to ship it a long distance, for it is not worth the freightage. The isolated plant will therefore be an economizer

of fuel whenever we have arrived at the point that will make us disposed to use these mine wastes.

Some operators already use such coal and find the use pays. The great difficulty of the isolated plant is that it costs too much money to run because of the cost of engaging a competent mechanical engineer, but there is no question that if power is generated out of the mine waste the engineer will justify his salary in a saving of coal used, in the maintenance of the line work and conductors inside and outside, and in the running of the machinery.

In this way eventually the question "Isolated Plants Versus Purchased Power" will take on a new phase. But still greater will be the difference if we make coke or semi-coke at the mines and obtain heat and power from the gases thus formed. For years boilers have been operated by heat from beehive coke ovens. Engines may be run from power generated by the gas from by-product ovens or from steam raised in boilers that are heated by byproduct-oven gas. In these cases we are, or shall be, faced with the problem of wasting the gas or using it in an isolated plant or at a central station plant located at the mines.

It must be remembered, however, that in low-temperature distillation as it has quite usually been conducted there has been no heat available for other uses. It may be expected that in the future the losses of heat in the low-temperature distillation process will be so reduced that there will be a disposable balance of which an isolated plant could make good use.

### Effect of War on Labor

**T**HE war just ended will not in itself promote the real interests of laboring men. It has made many cripples. These men will not have the productive ability that they enjoyed before the war, yet they must be permitted to consume as much, and most of us feel they should be so provided for that they will be able to consume a great deal more than they did before the war commenced. Consumption cannot safely be brought too close to production, and as the consumption of some individuals will not be balanced by their own production, every one is bound to receive less in values even though expressed in money they will doubtless receive more.

There is a disposition to believe that there will be a shortage of labor because many men have died from influenza or been killed by bullets and shrapnel; but concurrently the consumption of the products of labor will be less because of the mortality, and that will reduce the productive demand.

The only hope to be derived from the war is that it will stimulate reactions in the public mind which will increase production and thus make an increased consumption of products possible. If the labor records made in the bellum days are continued in the post-bellum days, we may look for a general increase in prosperity. The more we make, the more we have to distribute or to use for the facilitating of further production.

It is possible that the abilities of the worker and of the managements of our plants have been stretched by the war to such a point as to give the stretch a permanent set. If we, each and all, produce a little more than before, we shall more than overcome the handicap that the war has placed on us.

## DISCUSSION BY READERS

### Iron vs. Wood Mine Cars

*Letter No. 6*—Three years' experience with an allsteel car, enables me to compare this with my previous experience with wooden cars, and prompts me to say that I very much prefer the old-style wooden car for mine use.

In the first place, the iron car is expensive to install and to operate. The use of iron cars in mines also increases the cost of upkeep of the track. When an iron car jumps the track it generally breaks two or three ties and, perhaps, bends or breaks the rails.

A small company seldom possesses the kind of equipment required to repair iron cars that are damaged in a wreck. There is no arc-welding apparatus; and, without these extra appliances, the work of repair is slow and the car remains out of service too long.

On the other hand, wooden cars are less expensive to build, and the necessary material can generally be secured near at hand. Most mines are located where good white-oak timber can be obtained at a reasonable cost. Wooden cars are more pliable and, for that reason, are not so hard on the track. The repair of wooden cars is a comparatively simple matter and requires no apparatus except what is ordinarily found in a blacksmith or machine shop at mines. Finally, the time required to repair a wooden car is less than for an iron one.

—, Utah.

MINE FOREMAN.

### Cost of Upkeep of Mine Cars

*Letter No. 1*—I was glad to see the suggestion of a correspondent in *Coal Age*, Nov. 14, p. 918, in regard to the need of keeping an accurate account of the cost of repairs on mine cars. He drew particular attention to the difference, in cost, between haphazard and systematic methods of making such repairs.

To my mind, cost-accounting is a very important item in the operation of a mine and one that has been too long neglected. Many coal operators view the making of repairs as a necessary evil. Sometimes repairs are needed so often that they are an unnecessary evil. The frequency of repairs may be due to a poor type of mechanical construction.

#### ECONOMY IN SELECTING RIGHT KIND OF CAR

Today, when there are many different types of mine cars manufactured, the importance of ascertaining what types are more economical in actual use is greater than ever before. It is my experience that most coal operators pay large repair bills as a matter of necessity, without investigating the saving that might be effected by a change of equipment.

One notable exception to this rule that came to my notice, recently, is that of a large concern operating about a thousand cars in their mines. They concluded that it cost them \$5000 a year to make the necessary repairs due to the breaking of end-gates alone, and not con-

sidering other breakage resulting from the inherent weakness of the type of car they were using. Judging from the condition of the cars I have seen in that mine, the average cost of \$5 per car, per annum, for repairs appears to me as being reasonably low. I shall be glad to learn of other operators who have kept an accurate account of this item.

Manufacturers are now putting on the market several styles of dumps and cages for turning a solid car completely over in dumping, similar to the method of handling railroad cars on the big coal piers. A number of large operators, in various parts of the country, have installed these cars and dumps at their mines. They appear to be firmly convinced that this is an easy method of handling mine cars on the tipple. The car is handled much more gently when being dumped. The elimination of the end-gate, in a solid car, provides a type of construction that is stronger and more durable, and the cost of repairs is greatly reduced, being next to nothing.

SHELDON SMILLIE.

Pittsburgh, Penn.

*Letter No. 2*—Referring to the matter of keeping cost-sheets, showing the amount paid for repairs to mine cars, permit me to say that these sheets mean nothing if they are not kept accurately and made to show in detail what repairs are made and how often.

The matter of cost accounting, in repair work at our mine, has been a careful study with me for some time past. I have found that, in order to get results, one needs a large ledger, having the pages so ruled that the cost of labor and material expended on each car will appear in its proper column. Every car in the mine should be branded with its number, and the repairs made on each car should be entered against that number, in the ledger.

#### NATURE OF REPAIRS MADE SHOULD BE NOTED

In addition to noting the cost of labor and material and the date of repairs made on each car, there should be room to specify the nature of the repairs. One would be surprised to see how simple this data is to keep, when it is properly arranged, and to realize its importance in determining what improvements can be made in different features that will reduce the cost of future repairs. In other words, the weak points in the construction of cars are clearly shown by studying the ledger.

There is another feature of this cost accounting that is worthy of note. Repair men take more pains to do their work thoroughly. They realize that it looks bad to have a car returned too often to the shop for repairs. The natural conclusion is that the work was not thoroughly done, and they naturally want to avoid such a showing.

Wagon repairs should only be analyzed from a study of the ledger once a year. As mentioned previously, the

showing on the ledger will indicate clearly the style or kind of equipment that is most economical in service. This information is of particular importance in showing the advantage of certain kinds of car wheels, in respect to their size, bearings and lubrication.

Once every month there should be a competent man stationed on the tipple, with instructions to inspect each car as it comes out of the mine. All defective cars should be promptly turned in to the shop for repairs, before being again sent into the mine. This practice will be found to avoid many wrecks that would otherwise occur. There is no economy in postponing the making of needed repairs. Every practical mining man will agree with this statement. It is simply following out the old adage, "a stitch in time saves nine."

PENNSYLVANIA SUPERINTENDENT.

Uniontown, Penn.

## Cost Accounting in Mine Haulage

*Letter No. 2*—Referring to the suggestion of "Progressive," *Coal Age*, Nov. 7, p. 876, in regard to motor-haulage costs, I regret being unable to give definite figures, or to furnish a chart for estimating the costs in this branch of coal mining. I will, however, consider briefly the items that enter into the operating costs of haulage by motor. In all mine haulage, the items of cost fall under two general heads; namely, Operating Costs and Costs of Maintenance. I will attempt to specify these items and classify them under these heads.

Whether the power, in mine haulage, is supplied by a local branch or a public service company, it appears as a monthly operating charge, estimated as kilowatt hours, based on the horsepower, consumed in the operation of the mine. Where the power is furnished by a private or local plant, the charge for the same is based on the operating expenses and overhead charges of the power plant.

In other words, the power plant furnishing the power to the mine is an entirely separate and distinct operation, and performs this service at a reasonable charge, which is estimated in the same manner as a public service plant. It is, of course, the duty of a power plant to deliver power to the mine and, therefore, all transmission lines from the plant to the mine entrance belong to and must be maintained by the power plant. Transmission lines within the mine are the property of the mine owner and installed and maintained at his expense.

### HAULAGE EQUIPMENT RECKONED ON COST-SHEET

Turning now to the mine, it is clear that the mine-haulage system consists of the entire equipment, including motors, cars, rails, track material, transmission lines, switches, etc. This haulage equipment is inventoried and valued at a specific sum. The expense of maintenance of such equipment, which includes a proportionate sinking fund, must be charged to the operating account as a monthly rental. By so doing, a new man coming to the mine will have no advantage over his predecessor in office, but will be subject to the same continuous charge and rental for the haulage equipment.

To complete the operating charges, in addition to the cost for power consumed and rental of equipment, must

appear the wages of the motormen and helpers, the time for this service being charged according to the number of hours actually engaged in hauling. To these operating expenses must also be added costs for lubrication, repairs of motors and cars, which items would seem to belong particularly to the haulage account, while the upkeep of transmission lines and tracks belongs more properly to the equipment for which the haulage account is charged a monthly rental. My claim is that the charge for motor haulage, to be strictly fair, should be based upon the wages used and the material and current consumed. The last named item should be measured by a meter at the mine entrance.

Jeddo, Penn.

J. KENVIN.

## Freezing of Shafts in Winter

*Letter No. 4*—As zero weather approaches, managers of shaft mines are naturally concerned over the problem of keeping the shaft clear of ice in the colder months to come. The freezing of a shaft presents a trying proposition, and one that can only be successfully solved after a series of experiments to determine the effectiveness of seemingly practicable schemes.

In exceptionally cold winters, it has happened that an air shaft has been closed completely by the accumulation of ice; and where the hoisting shaft is the intake or downcast the mine has been forced, at times, to temporarily suspend operations, from the same cause. Before suggesting a remedy for this condition, allow me to cite one or two instances in my own experience.

### AN INSTANCE OF A FROZEN HOISTING SHAFT

The first instance occurred in a 300-ft. shaft, where the hoisting compartments were the main intake for the mine. The shaft was timbered with wood and the seepage of water was excessive. A few days of freezing weather would make it necessary to employ a force of men working in relays to remove the ice sufficiently to permit the cages to pass. Two, and sometimes four men, were on the cage at once cutting ice, the cage being hoisted 2 or 3 ft. at a time. Much of the ice cut fell to the bottom of the shaft and had to be cleared from the sump and hauled away into some abandoned portions of the mine.

In severe weather, the cage would freeze fast to the guides in a few minutes; and it would be necessary for the engineer to use slack rope to jerk it loose. I recall one instance where it was necessary to hoist the men out of the shaft with a rope when it was impossible to free the cage.

One can understand the danger of these undertakings when it is explained that the hoisting engine was a duplex 18 x 32 in., operating under 100 lb. gage pressure, the hoisting drum being 7 ft. in diameter. The cages were of the self-dumping type and weighed between 4 and 5 tons, while the hoisting rope was 1½ in. in diameter. Many times, a full drum (22 ft.) of slack rope and a full head of steam was used to get the cage loose from where it was frozen in the shaft.

When running the cages at night, during freezing weather, the usual practice was to hit one bottom and one gooseneck and catch the cages on the rebound with a full head of steam. One can imagine the enormous strain thrown on the hoisting machinery, cables, head.

frames, sheavewheels and cages, under such conditions; but these crude methods were the only ones known at that time. I have cited these instances to show the seriousness of the situation, and will now explain the simple manner in which these conditions were changed.

In the left hoisting compartment, an uncovered 2½-in. steam line supplied the steam to operate two pumps. As a result, there was but half the trouble from ice on that side of the shaft, the principal trouble being experienced in the right compartment where there was no steam pipe.

#### FREEZING PREVENTED BY SMALL STEAM LINE

By the plan now adopted, a ½-in. pipe was tapped into the steam supply line at the top of the shaft, and from this a ½-in. line was run 50 ft. down the left compartment, and two ½-in. lines were extended down the right compartment for the same distance. These were put in diagonally opposite corners of the shaft. A ½-in. valve controlled the flow of steam in these three pipe lines, under a pressure of about 90 lb. per sq.in. When hoisting coal, only a small amount of steam was admitted to the shaft, owing to the dense fog created.

A little difficulty was yet experienced by the formation of ice on the extreme right guide. This was overcome, however, by securing a can on the top of the cage and connecting two ¼-in. pipes in such a manner as to conduct the strong brine solution in the can and distribute it equally over the guide.

In January, 1918, the thermometer registered from 10 to 24 deg. below zero nearly the entire month. During that time the services of two men were required at night. They worked from two to four ours each night, clearing the cage seats and bottom landing so that hoisting operations would not be hampered the next morning. There is, now, practically no trouble with ice at this mine.

Another instance that I will mention occurred at the mine where the air shaft was the downcast. On several occasions, this shaft froze nearly solid at the bottom. The usual procedure, at such times, was to work men in relays and pay them double time for cutting and hauling the ice away from the bottom of the shaft. Owing to the exposure to the severe cold, men refused to work at any price until milder weather set in. It was, then, a case of shutting down the mine, which generated a great deal of gas. It is needless to say that these conditions entailed a large expense item.

In this second instance, the difficulty was overcome completely by connecting a ½-in. steam line to the steam supply for the fan engine. This was run down the shaft about 50 or 60 ft. No shutdowns have occurred by reason of the formation of ice in the shaft since; and, to the best of my knowledge, not a single man has worked on the shaft bottom for the purpose of clearing it of ice.

JACK L. BALL.

Amsterdam, Ohio.

### Waste of Coal

**Letter No. 1**—When reading the short article regarding the alleged waste of 150,000,000 tons of coal in the United States, each year, as published in *Coal Age*, Nov. 28, p. 973, I was deeply impressed with the illustration, showing this amount of coal as a solid cube 1785 ft. on

a side. It seemed to me that I must be dreaming and I pinched myself to make sure that I was awake and had all my senses.

It was my desire, at once, to flatten out this cube so as to represent a 6-ft. seam of coal, and I started to calculate the number of acres it would cover. The article states that the cubic contents of 150,000 tons of coal is, practically, 5,700,000,000 cu.ft. There are 43,560 sq.ft. in an acre, and the cubic contents of a 6-ft. seam covering 1 acre would be, therefore,  $6 \times 43,560 = 261,360$  cu.ft. From these assumed data,  $150,000,000$  tons of coal, in a 6-ft. seam, would cover  $150,000,000 \div 261,360 = 21,809$  acres.

Let me assume, now, 10 mines, each hoisting 2000 tons of coal per day and working 300 days in a year. On that basis, the time required for these 10 mines to work out such a tract would be  $150,000,000 \div (10 \times 300 \times 2000) = 25$  years.

#### WASTE ESTIMATED IN LABOR REQUIRED TO MINE

Again, let us estimate the number of men that would be required to mine out this coal in 25 years, each man working 300 days in a year and mining an average of 10 tons of coal a day. The number of men required, in that case, would be  $150,000,000 \div (25 \times 300 \times 10) = 2000$  men.

Further, if these men were paid 61c. per ton for loading this coal, the wages paid for loading alone would be  $150,000,000 \times 0.61 = \$91,500,000$ . Or estimating the coal burned by a single family, in a year, as 15 tons, the amount of coal represented by this waste would be sufficient to warm 10,000,000 families. The average consumption of coal in a year, by a single family, however, is considerably less than this estimate.

These figures impress us with the importance of conserving the fuel supply. The question comes home to us, How is this tremendous waste to be eliminated in the mining of coal. Let this proposition be discussed from a practical standpoint.

RUSSELL EXLINE.

Sullivan, Ind.

### Perplexities of Mine Foremen

**Letter No. 5**—I have been particularly interested in reading the letter of "Mine Foreman," *Coal Age*, Oct. 24, p. 793, in which he describes a difficulty that arose by reason of a coal cutter leaving 4 or 5 in. of bottom coal, in cutting a man's place. The coal cutter explained that it was necessary to raise his machine so as to avoid a roll in the floor.

Being well acquainted with the miner who worked in that place, I am informed that the machineman left 9 in. of bottom coal, which is a considerable proportion in a seam 3 ft. 9 in. in thickness. However, from my knowledge of the circumstances, I have no hesitancy in saying that the trouble could have been adjusted in a few minutes if the foreman had used his head.

The fact that the superintendent adjusted the matter without any trouble, later, shows that I am warranted in making this statement. In the conference that the superintendent had with the miner, I am told by one who overheard the conversation that the superintendent admitted that the miner was right. It will be remembered, also, that the Miners' Committee came to the same conclusion.

It is quite true that a mine foreman is frequently troubled and perplexed by small matters that are brought to him when they should be passed over quietly by the miner. It may also be true that the miner, in this case, went a little further than he was justified. Some would say that he should have fixed his place up himself and then demanded pay for his trouble. However, miners cannot be blamed for wanting to get their share and profit by the increased demand for coal and the general boom in the coal industry, today.

One does not have to look back many years to observe the great change that has taken place in mining conditions. Formerly, the miner was confronted with bad air, water in his place that he must bail out before he can go to work, while the scarcity of cars, timber and other supplies caused him much delay and loss of time. Notwithstanding the present improved conditions, it often happens that miners expect too much, and the mine foreman's patience is sorely taxed. On the other hand, we find many foremen who feel themselves above the miner and use their authority to deny what is the miner's just rights.

#### ADVICE TO MINE FOREMEN

Let me urge, here, that every foreman should be careful and know he is right before taking a stand against his men. Even then, it is not well for a foreman to "flatly refuse" a miner's request. Not long ago, I heard Mine Inspector Elias Phillips advise a mine foreman, who had stood out against a request of his miners and was, himself, in the wrong, about as follows: "There is one advice I want to give you. Be sure you are right before you take a stand against your men. If they are right and you are wrong, you might as well quit; but if you are right, they will soon find it out and you have gained a point."

While it is difficult to deal with some men, good judgment and careful study of human nature will go far to lessen the perplexities of mine foremen. A machinerunner, in attempting to avoid a roll, may leave more bottom coal than is necessary, but the foreman should be able to see when this is the case and allow the miner what is right. It is poor policy on the part of a foreman to allow such a matter to go before the Miners' Committee and even then refuse to abide by their judgment. He had better fix it up quietly with the man and do what is right if it is possible to satisfy him, in reason.

MINER.

Homer City, Penn.

## The Miner and Safety

*Letter No. 3*—It is with the deepest interest that I read the letter signed M. H. G., *Coal Age*, Oct. 10, p. 707. I feel justified in stating that there is no more important work with which mine officials are charged than looking after the safety of their men. At the present time particularly, it is the official's duty in any industry to use every possible means of conserving the man power, which is so important an item to the nation, in its need of increased production.

In my opinion, the fact seems to be well established that most of the accidents that happen to miners could be avoided with a little foresight and by taking proper precautions. The same is not true of other classes of

labor in the mine where men fall victims to accidents wholly beyond their power to avert.

It is my belief that safety should be taught universally, not only in coal mining but in every industry throughout the country. It would seem that there is no better way to show the need of workers taking the necessary precautions for their own safety than to illustrate, by pictures, how accidents happen and how they may be prevented. A campaign in the interest of safety, similar to the recent meeting of the National Safety Council at St. Louis, cannot fail to have a noticeable effect in reducing the number of accidents in mines, and causing men to heed the warning of "safety first."

Money spent in conducting such campaigns will always prove a good investment to any community. The large amounts now paid in compensation for fatalities would realize a greater gain if used to conduct a much needed safety campaign. It would pay for all the posters and advertisements necessary to impress lessons of safety in a way that would reduce avoidable accidents.

Permit me to say that there is nothing more effective in keeping a man from taking unnecessary chances while at his work than to have thoughts of his family who are depending upon him for support brought before him by such sympathetic pictures as were used to illustrate the letter of M. H. G. to which I referred previously. The leavetaking of the wife and baby in the morning, as shown in the first picture, when the miner is cautioned to be careful for the baby's sake, is a sad contrast to the scene described in the third and last picture, where the lifeless body of the uncautious miner is being brought to his desolated home. What more could be asked to induce miners to take these necessary precautions, not only for their own safety, but for the welfare of others dependent on them? Pictures impress themselves on the brain and cannot be effaced, while words of caution are quickly forgotten.

#### FOREMEN MUST SEE THEIR ORDERS ARE OBEYED

As stated in the letter of Lewis R. Thomas, Nov. 7, p. 877, it is the experienced miner who is the most frequent victim of serious accident. He is the one who is the most prone to take chances, depending on his long experience and freedom from harm. But, exemption from injury in the past is no guarantee of a like experience in the future.

For a foreman to order a miner to take down a bad piece of roof, or set a needed post for his protection, is not enough; but he should see that the work is done at once. Where a place is found to be dangerous and the miner is instructed to make it safe before proceeding to work, the driver should be told to set no cars in the place until the work is done. In the morning, drivers should be given a list of places that are dangerous, and forbidden to set cars there until further orders.

To show the need of taking every precaution, let me recite briefly a serious accident that happened to a car runner who was not informed as to what places were dangerous. The fireboss had marked a dangerous place in the morning, and fenced off the entrance on the haulage road so as to prevent anyone from going into the place unwarned; but did not consider it necessary or think of placing a similar warning at the crosscut leading from the adjoining room. It was through this lat-

ter opening that the driver entered the place just in time to be caught by the falling slate. It was his good fortune at the time, however, to be standing at the side of a car, which broke the fall of the slate and saved his life. In this position he was found a little later and rescued.

The incident just cited shows how a fireboss will seemingly comply with the requirements of the law and, yet, an accident may follow. In this instance, the car runner was accustomed to travel through the crosscuts from room to room, and had he been given a list of those rooms that were dangerous, he would have been warned and the accident might not have happened.

#### INSPECT THE TIMBERING OF ALL WORKING PLACES

Mr. Thomas suggests, at the close of his letter, the careful inspection of miners' places to see that they comply with regulations in regard to setting posts a specified distance apart along the face. Miners should not be permitted to exceed this distance. Another condition that is dangerous occurs in low seams where roof slate or rock must be taken down to make headroom for the car, so that it can be brought near enough to the face for loading. I see no reason why a miner should be permitted to mine under such rock for a distance of 10 or 15 ft., for the purpose of saving a little powder and extra work. In doing this he invites an accident.

In mines where it is necessary to lift bottom in order to get headroom for the cars, I have sometimes seen miners advance 30 ft. or more before doing the work of lifting the bottom. While advancing beneath such rock, only temporary timbers are set, and these are very liable to be discharged in blasting the coal. The permanent double timbers are only set after the bottom rock has been lifted. To prevent such a dangerous condition, the working places should be carefully watched by the foreman and his assistants.

In closing, I want to say again that safety should be taught universally and harder and more rigid rules made and enforced for the safety of the miner, who is too often prone to take his life in his hands and assume unwarranted chances. Safety, in coal mining, should not be treated as a cold business proposition, but should receive the hearty coöperation of every mine official and mine worker, whatever his position. All are alike responsible.

JOSEPH R. THOMAS

Plymouth, Penn.

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*Letter No. 4*—I was deeply interested in reading the letter of Lewis R. Thomas, *Coal Age*, Nov. 7, p. 877, and quite agree with him in all that he has stated concerning the attitude of the experienced miner when he is questioned regarding the condition of his working place. More miners are killed by falls of rock and coal who claimed to be more experienced than those who make no such claim. The reason for this is that the man who claims to be experienced in mining coal is very apt to be careless in regard to timbering his place, whether the roof is good or bad. It seems to be his desire to show his experience by his seeming disregard of danger.

In the State of Colorado, conditions in the mine vary so continually that there are hardly two mines having like conditions of roof. In one mine, the coal will be overlaid with a hard sandstone roof and, again, this will be replaced by a drawslate above the coal. In places,

there is a slate roof with numerous slips running in all directions. In some of the mines, the roof is full of "pots," or "Mexican hats," as we call them.

Only the truly experienced miner knows how to cope with these varying conditions and protect himself from danger. In order to make the mining of coal safe, in these mines, the state mining law requires that such a method of timbering the roof and spragging the coal shall be adopted, in each mine, that shall securely hold the roof, sides and face and meet with the written approval of the chief inspector of coal mines.

Chief Mine Inspector James Dalrymple insists that where coal is mined by machinery, props shall be set not more than 6 ft. from the face nor more than 5 ft. apart, with cap-pieces not less than 12 in. long. He also requires that all drawslate between the face of the coal and the timbers shall be taken down where such slate exists above the coal.

Mr. Dalrymple claims that the present method of timbering, by setting posts at stated distances apart regardless of conditions in the roof, is far safer than the old method of timbering where the miner relied on the sounding of the roof. He claims that roof conditions change when there is no change in the sound, and the method of timbering adopted protects the miner against these changes in roof conditions.

#### MINE OFFICIALS URGED TO "GET ON THE JOB"

Not only is the fireboss, in Colorado, required to examine the roof in each working place, to see that it is safe for work, when making his morning rounds, but the mine foreman or his assistant must visit each working place every day and see that it is timbered as the law requires. The foreman or his assistant must see that this is done before he leaves the place. Instead of enlarging, further, on the many conditions that lead to accidents, let me urge that it is the duty of every mine official to get on the job and see that each miner complies with the mining law and the mine rules and regulations in force at each mine.

Everyone familiar with mining knows that a miner's chief aim, in going into a mine, is to load every ton of coal possible and it makes little difference whether the man is an experienced miner or not; his only thought is the almighty dollar. Therefore, as long as the miner is paid for every ton of coal he can load, it is useless to depend on his individual regard for safety. Someone else must look after that. While we boast of our years of experience in mining, it is a fact that many of us would not be alive today had it not been for our interest in the other fellow's safety rather than in our own.

I recall a sad accident that happened to a mine foreman who found two men working in a place that was unsafe. After ordering the men out of the place and sending them home, the foreman returned to examine the roof more closely and was caught by the fall, which occurred suddenly, and killed him. He saved the lives of two of his men; but, relying on his experience, risked his own life and lost it.

In closing, let me impress on the minds of all mining officials that the safety of the miner is in their hands. Compel strict compliance with the mining laws and regulations and satisfy yourself that every man is working in safety, which is your duty.

Farr, Colo.

ROBERT A. MARSHALL.

## INQUIRIES OF GENERAL INTEREST

### Blow Struck by Steam Hammer

Will you kindly give, in the columns of *Coal Age*, a formula for calculating the blow struck by a steam hammer?

SUBSCRIBER.

Upper Lehigh, Penn.

As was explained in *Coal Age* a short time ago (Vol. 13, p. 984), it is only possible to calculate the energy stored in a hammer at the moment the blow is struck. This energy is expressed in foot-pounds, being the product of two factors, namely, the force of the blow and the distance in which the hammer is brought to rest. It is clear, therefore that the force of the blow, in pounds, can only be ascertained when the distance is known through which the hammer is brought to rest and this distance will vary with the density of the material struck.

To illustrate, a block of lead or other soft pliable substance, under a steam hammer, will develop a much less force than would result when a block of iron or steel is struck the same blow. For example, assuming that a blow of an energy of 1000 ft.-lb., or 12,000 in.-lb., falls on a block of lead, compressing it, say  $\frac{1}{4}$  in. The force of the blow is then  $12,000 \div \frac{1}{4} = 48,000$  lb., or 2 tons.

Again, assume the same blow falls on a block of malleable iron, causing a compression of, say  $\frac{1}{16}$  in. The force of the blow, in this case, is  $12,000 \div \frac{1}{16} = 192,000$  lb., or 96 tons.

The question of the force of a blow struck by a hammer is of little practical value, being only relatively suggestive.

### Steam Boilers at Coal Mines

Give briefly the more common causes of boiler explosions, and state the types of steam boilers in most general use at small coal mines.

—, Ky.

SMALL OPERATOR.

The more common causes of boiler explosions, as they occur in coal-mining practice are the following: (1) Low water in the boiler and the consequent overheating of the boiler plates and tubes when in charge of an incompetent fireman. (2) Lack of proper inspection and cleaning of the boiler at regular intervals. (3) The use of impure feedwater, resulting in the undue incrustation of the interior surface of the boiler, necessitating forcing the boiler and burning and blistering the fire plates. (4) Improper setting of the boiler, or settlement of the foundations, thereby bringing undue and harmful strains on the joints and other parts which become weakened and give way without warning.

Except in large power plants, the type of boiler commonly found at coal mines is either that known as the flue boiler or the return-tubular boiler. The former is

a cylindrical boiler 5 or 6 ft. in diameter and, perhaps, 30 ft. long, having two flues 10 or 12 in. in diameter and extending the length of the boiler. The boiler is heated by a furnace placed under the front end, the flame passing over a firewall to the rear and returning through the flues is conducted by the breeching to the stack.

The return-tubular boiler is of practically the same construction, except that it is generally shorter and the flues are replaced by a large number of small tubes 2 to 4 in. in diameter. More up-to-date power plants employ a type known as the water-tube boiler, which consists of a series of inclined tubes surmounted by a horizontal drum, with which the tubes are connected in a manner to permit of the free circulation of the water through the entire system. By means of baffle-plates the flame and hot gases of the furnace are made to circulate up and down among the tubes before reaching the stack. The chief advantage of water-tube boilers is that they are more highly efficient and less liable to explosion.

### Frogs and Latches in Mines

Kindly explain what is meant by the number of the frog, in a mine switch; and how to find the number of any frog that is on hand. For example, the frog I have here measures 3 ft. long, from the point of frog to the end of the two rails, which have a spread of 8 in. in that distance. Also, please explain what should be the length of the latch, in a mine switch.

Steubenville, Ohio.

DAYMAN.

These questions have been thoroughly answered in the reply to the inquiry on "Mine Switch Calculations," *Coal Age*, Nov. 21, p. 961. A frog having a spread of 8 in. in 3 ft., or 36 in., would be a  $4\frac{1}{2}$  frog. The number is found by dividing the length of frog by the spread; thus,  $36 \div 8 = 4\frac{1}{2}$ , the number of the frog. It is more common, however, to measure the entire length of the frog, end to end, and divide this length by the sum of the spread, measured at each end, as explained and illustrated by the figure, on page 961.

As there explained, also, the length of a switch latch, in coal mining, will depend on the radius of the curvature of the switch rails, and the desired clearance between the latch and the main rail at the hinge or pivot on which the latch swings. The length of the latch is found by multiplying twice the radius of the curve by the desired clearance, both expressed in feet, and finding the square root of the product.

For example, using a  $4\frac{1}{2}$  frog and a track gage of 3 ft., the length of lead rail is  $l = 2gn = 2 \times 3 \times 4\frac{1}{2} = 27$  ft. The length of the radius of curvature is then  $R = nl = 4\frac{1}{2} \times 27 = 121\frac{1}{2}$  ft. Then, assuming a clearance between the latch and the main rail at the hinge of, say 4 in., or  $\frac{1}{3}$  ft., the length of latch is  $x = \sqrt{2Rd} = \sqrt{2 \times 121\frac{1}{2} \times \frac{1}{3}} = 9$  ft.

## EXAMINATION QUESTIONS

### Miscellaneous Questions

*(Answered by Request)*

**Ques.**—A column pipe 100 ft. in height is full of water. A hole is bored in the pipe at the bottom and another hole halfway down. With what velocities will the water issue from these two holes?

**Ans.**—The jet of water that issues from the bottom hole has a velocity due to the height of the column pipe. In other words, the theoretical velocity of efflux is that due to a head of  $h = 100$  ft., which gives

$$v = \sqrt{2gh} = \sqrt{2 \times 32.16 \times 100} = \sqrt{6432} = 80.2 \text{ ft. per sec.}$$

Some authorities give a coefficient of efflux as 0.97, which makes the actual velocity of efflux  $0.97 \times 80.2 = 77.8$  ft. per sec.

The flow from the hole halfway up the pipe has a velocity due to a head of 50 ft., which makes the theoretical velocity of efflux

$$v = \sqrt{2gh} = \sqrt{2 \times 32.16 \times 50} = \sqrt{3216} = 56.7 \text{ ft. per sec.}$$

Using the same coefficient of efflux gives, for the actual velocity,  $0.97 \times 56.7 =$  say 55 ft. per sec.

**Ques.**—Suppose that, in a gassy mine, the quantity of air is 175,000 cu.ft. per min., measured in the return, and it contains 4 per cent. of firedamp, when the barometer is 30 in. (a) What quantity of firedamp is given off in the mine? (b) What is the least decrease of the quantity of air that will render the return air explosive? (c) What increase of gas will render the return air explosive?

**Ans.**—The question evidently means to state that the return current contains 4 per cent. of *methane or marsh gas*, as the term "firedamp" relates to any inflammable or explosive mixture of this gas and air, which would make the question quite indefinite. (a) The quantity of methane contained in the return current, on this assumed basis, is  $0.04 \times 175,000 = 7000$  cu.ft. per min., which is the quantity of the gas given off in this mine.

(b) The lower explosive limit of pure methane is reached when the proportion of air to gas is 1:13. In other words, the gas forms then 1/14 of the firedamp mixture. To reach this condition by increasing the quantity of air would make the entire volume of air and gas in circulation, in the return airway,  $14 \times 7000 = 98,000$  cu.ft. per min. This would show a decrease in the quantity of air entering the mine of  $175,000 - 98,000 = 77,000$  cu.ft. per min.

(c) To reach the same condition by an increase in the flow of gas into the mine would require a quantity of gas equal to 1/13 of the quantity of air now entering the mine. The quantity of air in circulation is  $175,000 - 7000 = 168,000$  cu.ft. per min. Therefore, the quantity of gas required to be generated, in this case, is  $168,000 \div 13 = 12,923$  cu.ft. per min. This would

mean an increase, in the quantity of gas generated in the mine, of  $12,923 - 7000 = 5923$  cu.ft. per min.

**Ques.**—At what point in the mine would you expect firedamp to be standing, and how does firedamp appear in a safety lamp?

**Ans.**—A firedamp mixture being lighter than air may be expected to accumulate in rise workings, or at the head of steep pitches where the circulation is not sufficient to sweep it away. Firedamp will also be found where it is generated in sufficient quantity, in dip workings, where the air passing is not able to keep the place clear of gas. In such a case, however, the gas does not accumulate in the place, but the quantity generated is greater than the air current can remove.

Assuming that "firedamp" is an inflammable or explosive mixture of marsh gas and air, its presence in the lamp will cause the lamp to fill with flame and, at times, the mixture will explode within the lamp. If the percentage of gas present is below the inflammable limit, the mixture is not properly termed *firedamp*, but merely a mixture of marsh gas and air. The appearance in the lamp will then be manifest by the formation of a flame cap, the height of which will vary with the percentage of gas present.

**Ques.**—Is there a disadvantage or loss in having the air travel at a high velocity, and why?

**Ans.**—A high velocity of the air current circulating in a mine is a disadvantage, for several reasons. Greater power is required to produce the circulation than where the air current is divided into two or more splits and the velocity decreased proportionately. A high velocity of an air current is a source of annoyance and danger. Men cannot work in a high velocity of the air passing the working face, with any degree of comfort, and there is danger of igniting the gas generated at the face by the flame of the lamp being blown through the gauze.

**Ques.**—Describe what, in your judgment, you consider the best method of conducting the air current to and along the faces of the working places.

**Ans.**—The main air current in a mine should be divided so as to ventilate each district with a separate split of air. The air should be conducted to the farthest point inby, before being deflected into the rooms on its return. By this arrangement, the greatest pressure is made effective at the inby end of the workings. The air current should be made to sweep the coal face in each working place.

**Ques.**—What will be the pressure per square inch at the bottom of a column pipe on a slope 450 ft. long and pitching 42 degrees?

**Ans.**—The vertical rise of this column pipe, laid on a pitch of 42 deg. is  $450 \times \sin 42^\circ = 450 \times 0.66913 = 301.11$  ft. Assuming that the pipe is full of water, the static pressure, at the bottom of the pipe, due to this head, or the pressure when the pump is not in operation is  $p = 301.11 \times 0.434 = 130.68 \text{ lb. per sq.in.}$

## COAL AND COKE NEWS

### Harrisburg, Penn.

The United Mine Workers of America have outlined the following proposed amendments to the Pennsylvania Workmen's Compensation law, which will be submitted to the Legislature by the mine workers' organization at the coming session in January, 1919.

1. The waiting period of fourteen days now provided in the act should be eliminated and compensation begin from the date of injury.

2. The injured employee should have the right to select his own physician.

3. Payment of compensation for the loss of members of the body, such as an eye, a hand, an arm, a foot, or a leg, should be doubled in amount and length of time of payment.

4. Compensation should be paid for the loss of fingers and toes.

5. Compensation should be paid for all disfigurement.

6. Where sons in families meet with fatal accidents, parents should be compensated without the necessity of proving dependency.

7. Compensation should be paid to invalid brothers and sisters, regardless of age.

8. Compensation should be paid to a widow or wife or until she remarried.

9. The basis of payments of compensation should be 70 per cent. instead of 50 per cent. of the weekly earnings.

During the 1917 session of the Legislature no important changes were made in the compensation law, as the Governor of the Commonwealth of Pennsylvania stated he would not agree to any changes for two years, so that the law would have a fair test. It is thought that during the 1919 session organized labor will make great efforts to have changes made, and it is very evident that much opposition will be made to the proposed changes. Another fight is contemplated on the proposed "Old Age Pension Bill."

Refusal of the Pennsylvania Railroad Co. to permit the loading of coal into cars from wagons is declared by the Public Service Commission, in deciding the case of McPhilomy & McPhilomy, trading as the Franklin Coal Mining Co., of Brisbin, Clearfield County, to have been unjust, unreasonable and discriminatory, and the company is ordered to pay damages amounting to \$500. The Commission, however, finds that the claim of the company that the railroad by failure to deliver cars prevented opening of a new seam of coal is not well found, and that the failure of the railroad to construct a siding was cause for damages aggregating \$18,000.

### Uniontown, Penn.

Influenza is slowly giving way in the Connellsburg coke region. Production for the week ended Dec. 7 is 600,581 tons as against 574,729 tons for the week ended Nov. 30. Fuel officials and operators generally see in the increase not only thewaning of the influenza epidemic but the results of the transition of the coke region from a war to a peace basis. The coming of peace found production at its lowest point since the war, and the week following showed another drop of 50,000 tons caused principally by the relaxation of the workmen to celebrate the event. Since then production has risen slowly and it is believed that production throughout the winter will hover around a weekly average of 600,000 tons' coal.

With a rating of 10,584 cars, a total of 5092 cars were lost by reason of labor shortage. Car shortage itself was held responsible for 782 cars. The cars shipped from the region loaded were recorded as 9942.

Coke showed an encouraging increase of 15,866 tons for the week, but an increase of only 2053 tons was noted in the shipment of byproduct coal. The aggregate production of 660,581 tons was divided into 270,993 tons of coke and 194,091 tons of byproduct coal.

### Charleston, W. Va.

The year is being wound up in West Virginia insofar as the coal industry of the state is concerned, by what may be termed a stagnant market and with producers waiting to see what the new year will bring forth. Unless it does bring at least a few months of coal weather, West Virginia operators do not look for anything but a dull winter. So far there has been absolutely no such weather as might have been expected at this time of the year, and this has had a detrimental effect on the industry, some mines partly suspending operations and others shutting down. Such cases, however, are the exception rather than the rule.

The railroads—large consumers of coal—are trying to force prices down and have the extremely warm weather as an aid. Some coal from the state is going to the South American trade. Production may be a little larger than usual before Christmas, in order to supply consumers over the holiday period, when the output will fall short of requirements because of the usual holiday absences of miners.

Production, generally speaking, showed an improvement during the second week of the month with miners returning from military service and with certain labor troubles adjusted. Various factors combined to restrict the output of the Fairmont region during the week ending Dec. 14, a shortage of cars being the chief impediment to normal production. Further trouble was experienced in getting prompt placement of cars, and while the health situation was gradually improving yet many mines are still short of their entire complement of men owing to cases of influenza.

As a result of lack of motive power, and contributing trouble, the Baltimore & Ohio was unable to furnish empties anywhere approaching ordinary requirements, as it has been able to do during November. Some encouragement was lent to the market situation by an influx of orders for shipment to South America. Railroads are still using rather large quantities of steam coal in the East.

### Fairmont, W. Va.

Labor conditions and the discussion of possible legislation occupied the time of the Northern West Virginia Coal Operators' Association at a meeting held here on Saturday, Dec. 14, attended by more than 100 members from Clarksburg, Elkins, Philippi, Morgantown, Kingwood and many other points.

A report made by Secretary F. J. Patton disclosed that the membership had grown from 77 operating companies having 147 mines to 154 operating companies with 238 mines.

A report was submitted by Chairman A. C. Beeson, of the Four States Coal Co., for the transportation committee dealing with such matters as compensation for "deadwork," etc.

Improvements being made by the Baltimore & Ohio Ry. in an effort to better transportation facilities and the general improvement in the car situation were reported by S. D. Brady for the committee on transportation.

It was suggested that the coal companies should maintain the Department of Mines and that the inspection forces should be increased because of the large number of new mines established in the last year. Mr. Isner declared the legislative committee was of the opinion that in one respect the mining laws should be amended, since under the present statute if an operator does not drain his mine he may be prosecuted, and if he does drain it into a stream he runs the risk of being prosecuted for polluting the stream.

The afternoon session was largely devoted to a discussion of future prospects and present conditions of the industry. Various labor questions also received a share of attention.

Secretary F. J. Patton stated that the association had received definite promises that there would be no discrimination in

the car supply and other forms of transportation service against the Fairmont district as there had been in the past. One of the features of the afternoon session was an address by A. W. Calloway, director of bituminous distribution for the United States Fuel Administration.

### Birmingham, Ala.

Coal production in the Birmingham district during the week ending Dec. 7 shows an increase of nearly 60,000 tons over the figures for the week ending Nov. 30. The week's output was 381,065 tons against 322,591 tons for the last week in November. The output for the week ending Dec. 14, according to the majority of the operators' unofficial figures, will show an increase over these figures also.

The shipping of coal into North Georgia by Kentucky operators will not be affected appreciably by the removal of the zone system, as that district has been part of the Kentucky and Tennessee zone for some time. Every ton that can possibly be mined is badly needed by manufacturers throughout the districts supplied by Alabama mines. Miners and operators are being urged to hang up record production marks by Government officials and the larger consumers of fuel.

Reports are current to the effect that the Woodward Iron Co. will announce plans for expansion in the Bessemer district shortly, whereby sixty new Koppers byproduct coke ovens will be built by that corporation in the near future. There is also much speculation in the district as to other expansion of the company, and it would not be surprising, expert authorities say, to see that company branch out into the steel producing business.

At present there are four of the company's five furnaces in operation. The big byproduct oven plant at Woodward is undergoing considerable repair work. The company owns thousands of acres of coal lands, which are being steadily developed. A new mine, a short distance from Dolomite, is now ready to produce coal.

Contracts for coke are being offered practically every concern of this nature in the entire district, but few are being accepted, as the district is suffering from under-production of the product. Foreign countries, particularly Mexico, are clamoring for the fuel to be used in smelter work.

The announcement that Director General of Railroads McAdoo had approved the expenditure of \$1,600,000 for additional equipment to be used in the operation of the Warrior River barge transportation system was hailed with joy throughout the Birmingham district.

### Victoria, B. C.

Experiments have been at progress at the collieries of the Canadian Western Fuel Co., Nanaimo, B. C., for the last two months in the effort to arrive at a solution of the problem of rendering impossible (or reducing the possibility to a minimum) a repetition of such an accident as that of last September, when the rope used in the Protection Island shaft broke, causing considerable loss of life.

The ingenuity of Thomas Price, master mechanic for the company, has resulted in an arrangement which seems to come close to meeting requirements. He has devised, and demonstrated its practicability in actual operation, a working model of a four-rope hoisting system. George Wilkinson, chief inspector of mines, describes the arrangement as follows:

"There are four complete hoisting ropes, an overwind rope and an underwind rope on each compartment of the drum. Four pulley wheels are used, two of them being set some distance above the other two to avoid fouling of the ropes.

"The ropes on the two upper pulleys cross. A drum of the usual dimensions is used and having an overwind and underwind rope on each compartment, the one rope is being wound while the other is being wound.

"As the under rope is being wound on the drum and the cage is hoisted an overwound rope is being unwound and descends with the cage in the opposite compartment. The

operation is the same on the other side of the drum. The whole operation is made feasible by simply crossing the two ropes that lead to the two upper pulleys."

Mr. Wilkinson asserts that this is one of the simplest and most practical arrangements he has seen in use on safety ropes. He points out that everything is under control of the engineer, the same hoisting speeds being used on all ropes. Any possibility of slipping is avoided because all ropes are fastened to the drum.

Preparations are being made by the Western Fuel Co. for the installation of this double-rope system at its new mine, the Wakesiah, near Nanaimo, B. C.

#### PENNSYLVANIA

##### Anthracite

**Drifton**—Gambling on the prospect for an open winter, the Lehigh Valley Coal Co. has cancelled orders, effective at once, for the suspension of the Woodside coal banks operations, and these will be continued indefinitely. The fuel was dumped out as unsalable 65 years ago. The coal will be prepared at Drifton No. 1 breaker.

**Wilkes-Barre**—The Lehigh Valley Co. has filed a blanket appeal with the Luzerne County courts against the assessments on its anthracite bearing tracts within the Hazleton city limits. There is a general move on foot to advance the valuation of coal lands and to force anthracite operators to pay more taxes in the communities where they dig their commodity. Hazleton's assessment of the coal lands is over \$3,500,000.

**Edwardsville**—The steel framework of the new Woodward breaker of the Delaware, Lackawanna & Western R.R., coal department, has been completed and work on the roof and installation of machinery is under way. The structure will cost over \$2,000,000 and is said to be the first all-steel breaker built. It is 200 ft. high and about 15,000 tons of steel will be required. The work is being done by the bridge and construction department of the coal department, which will complete its task early in 1920.

**Eckley**—Mrs. Eckley B. Coxe, whose benefactions to the families of the miners in the Coxe mining villages have won her the title of "the angel of the hard-coal fields," has come to the rescue of the influenza stricken population of Eckley, named after her late husband. More than 10 per cent. of the town is down with the plague, and there have been many deaths. Mrs. Coxe organized a corps of doctors and nurses and sent them to take charge of the situation and supplement the efforts of the welfare department of the Lehigh Valley Coal Co.

##### Bituminous

**Dawson**—T. Robb Deyarmon has sold the 140-acre farm known as the John A. Fisher estate in Westmoreland County, to Millers Brothers. The farm is underlaid with coal.

**Pittsburgh**—The Crucible Fuel Co. has acquired the mine of the Cornell Coal Co. This is a slope mine in the Freeport seam of coal in the Allegheny Valley in Allegheny County, on the Conemaugh division of the Pennsylvania Railroad.

**Heilwood**—Ten more houses have been completed for the Penn-Mary Coal Co. at Clement, where Nos. 11 and 12 mines were opened recently. The second floor of the store building here of the Heilwood Co. is being remodeled and equipped as a clubroom for the coal company employees. Among the amusements will be pool and billiard rooms and a reading room.

**Brownsville**—Fire early Thursday morning, Dec. 19, destroyed the motor house, stockroom and office of the Pike mine, which is owned by the Diamond Coal and Coke Co. The loss was placed at \$30,000. It is said that the fire was of incendiary origin. Within the last four years the company lost four tipples, one barn and a large store at West Brownsville.

**Waynesburg**—J. H. Strawn, receiver of the Farmers' and Drovers' National Bank of Waynesburg, has sold to Thomas M. Ingraham and Frances I. Baily, of Cumberland township, two tracts of coal in Franklin and Center townships, with a total acreage of 283. The same purchasers have bought the J. B. F. Rinehart tract of 47 acres. The total consideration is said to be \$40,000.

#### WEST VIRGINIA

**Page**—The Loup Creek Colliery Co. at its plant here, in the New River field, has installed and has in operation a new 200-kw. rotary converter.

**Buckley**—Among recent improvements made at the plant of the Boone Smokeless Coal Co., in the Raleigh field, has been the

construction of a new substation, which was put in operation on Dec. 17.

**Sand**—With the completion of a siding at its operation at this place, the Brady-Tucker Coal Co., of which D. A. McDevitt is general manager, expects to begin the shipment of coal by the first of the year.

**Logan**—Latest improvements to be made by the Main Island Creek Coal Co. at its Omar plant, in Logan County, include the installation of two 200-kw. rotary converters, under the direction of the West Virginia Engineering Co., of Charleston.

#### KENTUCKY

**Madisonville**—Two men were killed by a premature shot in the Robert Forsythe mine near Providence, Ky., on Dec. 19. The men failed to come out at night, and a search was made, the bodies being found at 1 o'clock in the morning. The men were shotfitters.

#### ILLINOIS

**Edwardsville**—The Donk Brothers' mine here was closed down last week on account of two boilers at the power plant giving way.

**Plainview**—A new coal development is being promoted in this vicinity by A. W. and A. M. Crawford, who have successfully promoted a number of operations in Macoupin County. Drills have been ordered in and it is announced that prospecting will begin at once. Options are held on many hundreds of acres of land.

**Witt**—The two mines at this place have closed down, throwing 800 to 1000 men out of work. Many of them are seeking work elsewhere. Some have gone to the Kortkamp mine and some to Taylor Springs. The closing of the Witt mines came suddenly and without explanation. Most of the miners had bought Liberty Bonds, which were only partly paid for.

**Taylorville**—The Taylorville mine has been put out of commission temporarily by the fall of a cage on which six tons of coal was being hoisted. The axle of the sheave wheel broke at the top of the tipple and the weight of the coal tore away the automatic safety catches. The cage fell 200 feet to the bottom. Nobody was hurt. The 475 miners in the mine had to climb 600 feet up the airshaft stairs.

**Carlinville**—Coal was reached last week in the new mine promoted by Carlinville men, and the first load was sold on the public square for the benefit of the Red Cross. The sinking of the shaft was necessitated by the sale of the Carlinville mine several months ago to the Standard Oil Co., followed by the announcement that the new owners would not supply the local trade. The shaft has been cemented as it was dug, and as soon as screening equipment arrives the mine will supply all the needs of the community. In the meantime mine-run is being sold.

**Hillsboro**—One of the largest transactions in coal lands in the history of the trade is about to take place at Farmerville in this, Montgomery County. The Elly coal lands, in the north and west part of the county, which were taken over by the custodian of alien property, are to be sold. The lands contain extensive deposits of coal, some of the veins being 10 to 14 ft. thick. The lands, comprising several hundred acres, were held by the Elly Coal Co., which was organized in Germany, where most if not all of the stock is held. The principal offices of the company are at Girard, Ill.

#### Foreign News

**Sydney, N. S.**—It is stated here that the Dominion Coal Co. has made a formal offer to Fuel Controller Magrath to lease or purchase the Florence mine of the Nova Scotia Steel and Coal Co. Under the offer, it is understood, the value of the property would be fixed by arbitrators, to be appointed by the Government. It is also announced that the Dominion Coal Co. will develop and operate its extensive submarine areas in the Florence district.

**Paris, France**—Soft coal is \$20 a ton in Paris. A family of from one to five persons gets 132 lb. of coal a month for cooking if the family does not have gas, and 132 lb. for heating. Similarly, a family of six persons is allowed 198 lb. of coal for cooking and as much more for heating. In England coal is rationed in proportion to the number of rooms in the house. In France a family of two persons occupying a large house of 15 to 20 rooms gets no more coal than the family of two living in a two-room flat. Paris does not expect to shiver as it did last winter, as the

municipal authorities will draw upon the 80,000 tons of dry wood that have been stored in warehouses for use in emergencies. Other French cities have similar wood stores.

**Ottawa, Ont.**—The Lignite Utilization Board, of which R. A. Ross, consulting engineer, of Montreal, is chairman, reports that the large plant which is to be established in Saskatchewan for briquetting the lignite coal of that province will not be in operation until the spring of 1920. Before proceeding with the work of construction the board will devote six or eight months to preliminary researches with which object in view Edgar Stansfield and R. de L. French, mining and chemical engineers, have been commissioned to make a comprehensive inspection and study of the carbonizing and briquetting plants in operation in the United States, and are now engaged in that work. Six months more will be required for the construction of the plant and the installation of machinery, in addition to the time necessitated for commercial adjustments, so that the spring of 1920 is the earliest date at which the plant can be put in steady operation. The capacity will be 30,000 tons yearly, but this production is a comparatively small consideration as the chief object of its establishment is to demonstrate the commercial feasibility of the process and to induce private capital to engage in the briquetting of lignites, in order to replace the anthracite now imported into the Canadian West with the domestic product.

#### Personals

**Samuel T. McMillen** has resigned as superintendent of the Fulton Run shaft of the Jefferson and Clearfield Coal and Iron Co. at Ernest, Penn.

**Benjamin Bish** has been made superintendent of the Loash Coal Co. mines at Knoxdale, Penn., to succeed W. B. McInch, who recently died of influenza.

**Carel Robinson**, of Russellton, Allegheny County, Pennsylvania, has resigned as general manager of the Superior Fuel Co., effective Dec. 31, to take charge of the mines of the Boone County Coal Corporation at Clothier, W. Va.

**H. T. Booker** has been appointed general superintendent of the United Coal Corporation, Pittsburgh, Penn., vice Edward H. Coxe, resigned. Mr. Booker's appointment takes effect as of Dec. 15. He will be in charge of the operation of the corporation's mines and all matters incident thereto.

**Lieutenant Paul T. Norton, Jr.** who resigned his position as division engineer of the Somerset division of the United Coal Corporation of Pittsburgh, Penn., about a year ago to enter the army, has returned from overseas aviation service. Lieutenant Norton expects to return to work, probably in his former position.

**Charles M. Means**, of Pittsburgh, Penn., head of the United States Fuel Administration division of bituminous coal inspection, has sent his resignation to Dr. Garfield, to take effect Jan. 1. Mr. Means, who is an engineer with offices in the Henry W. Oliver Building, began his duties in Washington on Apr. 12 last.

**Captain John Gibson, Jr., of Pittsburgh**, Penn., returned on Dec. 14 from Camp Humphreys, near Washington, D. C., where he has been in charge of training an engineer company for overseas service. Captain Gibson has received his discharge from the service and will at once resume his duties as general manager of the Penn Smokeless Coal Co. in the Union Bank Building, at Pittsburgh.

**A. C. Callen**, professor of mining engineering and head of the department of mining extension of the West Virginia University, Morgantown, W. Va., has been granted a four months' leave of absence, beginning Jan. 1, 1919, to make a survey and study of the various mining regions of the United States. **R. Z. Virgin**, who for some time has had charge of mine extension work, will take charge of Professor Callen's classes at the university during his absence.

#### Obituary

**James Long**, aged 76 years, of Hazel Brook, Penn., formerly superintendent of the Silver Brook, Black Ridge, Hazel Brook and Eokley collieries of the J. S. Wentz Coal Co., and a leading anthracite authority, died on Dec. 15 of pneumonia.

## Trade Catalogs

**Giant Semi-Diesel Fuel Oil Engine.** Chicago Pneumatic Tool Co., Chicago and New York. Bulletin 34-W. Pp. 32, 6 x 9 in., illustrated. Gives the vital points in oil engine design and describes the details of construction, fuel requirements and general characteristics of the concern's fuel oil engine.

**Green Materials Transfer and Storage Hopper.** Green Engineering Co., East Chicago, Ind. Pp. 15, 8 x 10 in., illustrated. A booklet intended to show those who have materials to handle and to store the pictorial story of the Green hopper. Information is given concerning the erection of the hopper.

**Economical Handling of Coal and Ashes and Reserve Coal Storage.** Link-Belt Co., Philadelphia. Book No. 353. Pp. 52, 6 x 9 in., illustrated. Reprinted from a series of articles by Henry J. Edsall, M. E., which appeared in *Steam*, 1917-1918. Contains much valuable data, and is in effect a treatise on coal storing and coal-handling machinery.

**Space and Speed in Steel Buildings.** Milliken Brothers Manufacturing Co., New York, N. Y. Booklet, pp. 24, 6 1/2 x 9 1/2 in., illustrated. Describes the Standardized truss unit system of building construction, designed and manufactured by this company. Hundreds of buildings of this type have been erected for the Government in different parts of the country.

**Jeffrey Standard Bucket Elevators.** Jeffrey Manufacturing Co., Columbus, Ohio. Catalog No. 244. Pp. 71, 8 1/2 x 11 in., illustrated. A well printed catalog, profusely illustrated, describing the advantages of using this company's elevators. Capacities of standardized elevators are given, and among other data that of how to select elevators and the general arrangement of the standard track hopper. Typical installations are shown, along with complete layouts and specifications.

**Tool Steels.** Carnegie Steel Co., Pittsburgh, Penn. Pp. 24, 5 x 7 1/2 in.: illustrated. Gives valuable data and tables appertaining to electric tool steels. The heat colors shown on page 12 and the temper colors on page 15 are really remarkable. The heat colors shown range from dark red to bright yellow, while the tempers range from normal steel to gray green. The different grades of steel produced by the Carnegie Company are listed and the uses to which each may be put.

## Industrial News

**Snoqualmie, Wash.**—The Niblock coal mine is to be extensively developed by its Seattle owners.

**Astoria, Ore.**—The Port of Astoria Commission is giving serious consideration to the matter of the construction of a half a million dollar coal bunkers and dock in this city.

**Gray's Landing, Penn.**—The Consolidated Coke Co. is rebuilding its Donald washery at this place and has awarded Roberts & Schaefer Co., engineers, of Chicago, a contract for the reconstruction work.

**Louisville, Ky.**—After being out of commission due to fire for a period of nearly two years, the big plant of the Kentucky Public Elevator Co., grain handlers, will start operations within a few days. This concern operates a large steam plant and is located on the Illinois Central terminals.

**Seattle, Wash.**—The 23d annual winter mining session of the University of Washington, College of Mines, will begin Jan. 2, 1919, and last for three months. Full courses of studies will be given in quartz mining, coal mining and metallurgy, etc. The session is open without examination to all who are interested in mining.

**Salt Lake City, Utah.**—Frank Waterhouse & Co., of Seattle, have closed a contract for large quantities of coal from the Peerless Coal Co., of this city. Waterhouse & Co. will act as distributors for Washington, Oregon, northern Idaho, California and the Hawaiian Islands. The Peerless Coal Co. is headed by James D. Murdoch and Ezra Thompson.

**Columbus, Ohio.**—Federal Manager Contractors of the Hocking Valley Railway Co. says that plans to spend \$6,000,000 in double-tracking the road between Columbus and Toledo, and the making of other improvements during the coming two years,

will go forward. One-half of the amount is to be expended in 1919 and the remainder in 1920.

**Charleston, W. Va.**—The damage suit of the Breamer Red Ash Coal Co. against the Sandy Ridge Coal and Coke Co. found its way to the Supreme Court, which a few days ago awarded a writ of error on the petition of the plaintiff company from the action of the Mercer Circuit Court in setting aside a jury verdict which gave the plaintiff damages.

**Des Moines, Iowa.**—H. L. Stevens & Co., of Chicago, construction engineers, while excavating for a boiler room at the Brown Hotel, uncovered a good seam of coal. After 23 ft. of earth had been taken out the coal, which is said to be 4 to 5 ft. thick, was discovered by the excavators. The Brown Hotel is located at the edge of the business district of Des Moines.

**Wilmington, N. C.**—The Cement Products Co., manufacturers of the "Sanisep" portable sewerage disposal systems that have met with such large favor in many coal-mining communities, announces that effective Jan. 1, 1919, J. B. Shatzer will assume control of its sales department as sales manager. On the same date C. E. McKee, former sales manager, will cease to represent the company in any capacity.

**Toledo, Ohio.**—The Kanawha & Michigan Railroad Co. pleaded guilty to nine counts in a twenty-count indictment charging rebating, in the Federal Court at this place. The company was charged with rebating to the Kellys Creek Colliery Co. The railroad company was fined \$5000 and the coal company was fined \$1000. The Tennessee & Ohio Central Railroad Co. pleaded guilty and was fined \$1000 for failure to notify a consignee for 39 days of the arrival of a car of coal.

**St. Louis, Mo.**—The St. Louis Fuel Committee has granted the request of the Breece-Trenton Coal Co. for a reclassification of the output of its mines at Breece and Beckemeier, changing it from Standard to Mt. Olive. The effect is to enable dealers to charge 25c. a ton more for the output of these mines than has heretofore been charged. A number of other Standard operators, in view of action in the Breece-Trenton case, are demanding the reclassification of their output.

**Charleston, W. Va.**—At the West Virginia Coal Association meeting here on Wednesday, Dec. 18, the executive committee formulated a plan to secure the weighing of coal near the eastern border of the state instead of at Tidewater, as is now the case, coal not being weighed until after it is dumped, causing serious delays in settlements. Realizing that a market will have to be found for excess production after peace is fully restored, the executive committee also gave serious attention to the future of the export trade.

**Louisville, Ky.**—A concern which will shortly be a considerable consumer of coal in the Louisville district is the Standard Oil Co. of Kentucky, which is erecting a million dollar refinery at Louisville, with rail and water connections via the Ohio River. This plant is designed on big lines, and is equipped to burn a tremendous amount of coal, having automatic stokers of the Illinois type throughout, both in the steam plant and for refining or distilling oils. The company's office is at Fourth and Bloom Sts., Louisville.

**New York, N. Y.**—The Byproduct Coke Producers' Association, which held a two-day session in this city last week, voted to divide its work into two groups—the Atlantic and Middle West. These groups will be presided over by a vice president of the parent organization and will hold separate meetings, but will meet as a national body frequently. The officers chosen were: President, W. H. Ball, of Syracuse; vice president for the Eastern group, Nils Anderson, of New York; vice president for the Middle West group, J. A. Galligan, of Chicago, and secretary, Parker H. Woods, of St. Louis. Mr. Anderson is the president of the Debevoise-Anderson Co., of 55 Liberty St., this city.

**Charleston, W. Va.**—There were fewer deaths in the mining industry of West Virginia through accident during November than has been the case for some time, the casualty list containing the names of 29 men, nine of whom were crushed under falling coal, etc., and 11 of whom met death on or under mining cars. Four men met death in connection with the operation of motors, this making a total of 25 deaths inside the mines, including a miner who was electrocuted. One man was killed in the machinery on a tipple and the other fell from a tipple. Two died from mis-

cellaneous causes. The greatest number of deaths—seven—were in McDowell County, Logan being second with five and Wyoming with 4.

**McAlester, Okla.**—Spirited bidding and heavy purchases by the leading coal companies marked the sale of the segregated coal and asphalt deposits underlying the Choctaw and Chickasaw Indian Nations at McAlester on Dec. 11-14. Of coal and asphalt deposits, with an appraised valuation of nearly \$14,000,000, more than \$3,000,000 worth were sold outright. The Rock Island Coal and Mining Co., which furnishes much of the coal burned by the Rock Island Ry. lines, purchased these deposits to the value of more than \$1,000,000. The Folsom-Morris Coal Co. also purchased deposits valued at about \$1,000,000. Numerous smaller companies and individuals made purchases. The purchasers in most instances will begin at once to develop their properties.

**Portland, Ore.**—Shipments of coal from Alaska to Portland may become a real fact next year, providing sufficient tonnage can be obtained, according to the purport of a letter received by the Portland Chamber of Commerce from the Anchorage Chamber of Commerce. The coal situation in the city is becoming a vital one in view of the increase of port affairs, and the recent organization of the West Coast Coal and Dock Co. is taken as an indication of activity of the coal question. This concern has been formed by Max Hauser, grain merchant, and several other prominent men of the city. It has leased the O. & C. dock on the east side of the Willamette River and it will immediately install the latest coal-handling equipment. The dock is capable of handling 50 cars at one time and will take vessels up to 650 ft. long. It is the intention of the company, which has been capitalized for \$100,000, to handle Utah, Wyoming, Washington and foreign coal, and in addition to caring for the export and shipping needs it is planned to sell fuel to dealers at home. The wholesale trade only will be catered to.

**San Francisco, Cal.**—Plans and specifications have been completed by Beckman & Linden Engineering Corporation for the installation of a 20,000-kw. steam turbine generating plant on the Tesla coal mining property, recently purchased by that concern from the receiver of the California Safe Deposit and Trust Co. The steam plant is to burn powdered lignite from the Tesla mines and the power is to be sold commercially to assist in meeting the power shortage in the San Francisco bay district. Researches by Beckman & Linden indicate that one ton of powdered lignite will give the same efficiency as five barrels of fuel oil. With fuel oil at \$1.67 a barrel and the powdered lignite selling at about \$4 a ton, a saving of more than 50 per cent. in fuel costs is indicated. The investment for apparatus to burn the powdered lignite is not any greater than the investment required to install oil-burning equipment, Linden explains. Oil burners can be converted for this use at a low expense, he said. It is the intention of the company to market the lignite in powdered or unpowdered form, so that purchasers may powder it for their own use. Tests have been made here by the United States Fuel Administration which demonstrates the feasibility of using powdered lignite under a 50-hp. boiler.

**New York, N. Y.**—The demands of the marine workers of New York harbor will be submitted to arbitration, according to the decision of the National War Labor Board, of which former President Taft and Basil M. Manly are the joint chairmen. For the past few weeks it has been feared that the marine workers would stop work because of the refusal of the New York Boat Owners' Association, the Tow Boat Exchange and the Lighterage Association to accede certain demands, which included an increase in wages and an eight-hour day. The workers contended that the master should be submitted to the Board of Arbitration, New York Harbor Wage Adjustment, for adjudication under an agreement signed several months ago. The boat owners held that the Board of Arbitration ceased to exist when the Railroad Administration withdrew from the arbitration agreement. Several times, pending the negotiations, the marine workers threatened to stop work, which would have resulted in tying up shipping in this harbor and in throwing about 60,000 men out of employment. The matter was finally taken up by the Washington authorities and on Saturday last a hearing of the grievances was held in the City Hall with the result that both parties were ordered to submit their claims to the Board of Arbitration for adjustment.

## MARKET DEPARTMENT

### *Weekly Review*

**Coal Industry Hopeful for Future—Demand at End of Calendar Year Falls Off Considerably—No Tone to Coal Market—Anthracite Situation Improved—Bituminous Being Offered Freely—Low Grades Selling Below Government Maximum**

WITH the close of the calendar year we find the coal industry turning hopefully toward the future. During the last twelvemonth the accomplishments of the anthracite and bituminous mines have been recorded with no uncertain hand. It has been a momentous year for coal. But what a contrast is presented between the fuel situation today and that which existed at the beginning of the year! Then the country was working at feverish haste. Plants occupied in the manufacture of war necessities knew no idle moment. The national smithy was engaged in the task of forging the links of a chain that was to bind militarism hard and fast. Uncle Sam kept calling for more and more coal as he worked the bellows. Today finds the task completed. Militarism has been shackled, never to free itself, we hope, and the embers under the national forge are no longer glowing with their former intensity. The need for coal is no longer urgent.

The present lull in the demand for fuel, however, is somewhat in the nature of a breathing spell. There is a great deal of uncertainty, a great deal of questioning. During the war the Government has had its controlling hand on practically every industry. This control is gradually being relinquished. During the war the Government was the largest purchaser of the output of our plants. Gradually the industries are being permitted to resume their normal relations with each other, and soon the coal industry will come into its own again.

At the immediate moment there is a decided lack of tone to the coal market. Anthracite demand is dull, owing to the unusually mild weather, and some shippers have received orders to discontinue the delivery of egg and pea sizes, as these coals are plentiful. The steam trade, too, continues to display evidences of inactivity. Many operators are unable to dispose of their tonnage of rice and barley, and some of the

smaller shippers have been compelled to store their output of these sizes on the banks. The production of anthracite from Apr. 1 to Dec. 14 inclusive is estimated at 70,702,000 net tons, 1,474,000 net tons behind the output of the corresponding period of 1917.

With the exception of the high-volatile coals, there is sufficient bituminous to meet all demands. Some of the largest producers of high-grade coals report curtailed production on account of a recurrence of influenza, together with a short car supply. Illinois and Indiana mines are losing an average of one day a week due to no market. Ordinary grades of soft coal are being offered freely, and it is reported that quite a little tonnage is being sold below the Government maximum. At tidewater there continues to be a dearth of the good grades of bituminous for bunkering. The output of soft coal for the coal year to date is 431,242,000 net tons, an increase of 39,341,000 net tons over 1917.

#### WEEKLY COAL PRODUCTION

The improvement in production of bituminous coal reported during the week of Dec. 7 failed to continue during the week of Dec. 14, the estimate during that week placing production at 10,636,000 net tons, a decrease of 346,000 net tons, or 3.2 per cent. The production during the week of Dec. 14 for the first time since Oct. 26 exceeded the output of the corresponding week of 1917, such increase amounting to 1,443,000 net tons, or 15.6 per cent. Reports from the carriers show in central and western Pennsylvania, where the greatest demand for bituminous coal exists, that considerable improvement occurred during the week of Dec. 14 in car loading, while on the contrary in Illinois and Indiana, where approximately one day a week is lost by the mines due to lack of demand, the decrease in cars loaded was the greatest that occurred in any district during the week, amounting to 14 per cent and reaching the low level of the corresponding week of 1917.

For the coal year to date the production of bituminous coal is estimated at 451,242,000 net tons as compared with 391,901,000 net tons during the period Apr. 1 to Dec. 14, 1917, a gain of 39,341,000 net tons, or 10 per cent.

The production of anthracite during the week ended Dec. 14, estimated at 1,924,000 net tons, not only exceeded the week preceding by 117,000 net tons, or 6.4 per cent, but exceeded the corresponding week of 1917 by 146,000 net tons, or 8.2 per cent, and recorded the largest weekly production since Oct. 12. The daily average during the current week of 321,000 net tons was but slightly below the average for the coal year to date, and was 9000 net tons, or 3 per cent, below the daily average for the similar period of 1917. The total production for the coal year to date is estimated at 70,702,000 net tons, and falls below the production during the period Apr. 1 to Dec. 14, 1917, by 1,474,000 net tons, or 2 per cent.

Reports from the carriers show increased loading during the week of Dec. 14 in the

central and western Pennsylvania districts and a considerable decrease from the central and southwest states. During the corresponding week of 1917 storms cut production to the low mark of slightly over 9,000,000 net tons, the loading during that week being considerably below that of the present week in all districts with the exception of the central and western states. The storm occurred mainly in Ohio, where the increase in weekly loading this year over last amounted to 9304 carloads or 72 per cent. All districts continue to report, for the coal year to date, an increase in cars loaded over the same period of 1917.

Bituminous coal to New England, during the week ended Dec. 14, is estimated at 326,497 net tons and is approximately the same tonnage as shipped during the week preceding. The rail tonnage during the week increased slightly, while the water shipments show a slight decline. The three northern harbors, New York, Philadelphia and Baltimore, report a falling off in tonnage loaded, while bituminous coal shipped from Hampton Roads increased approximately 18,000 net tons, or 15 per cent. While shipments during the last few weeks to New England were equal to not more than two-thirds of the weekly average for the coal year to date, total shipments for the coal year to date, amounting to 20,363,914 net tons, are in excess of the budget outlined by the United States Fuel Administration by 49,884 net tons.

Tidewater shipments of bituminous coal during the week of Dec. 14, while lower by approximately 23,000 net tons, or 3 per cent, than shipments during the week of Dec. 7, are holding up extremely well, and during the past few weeks have amounted to approximately 80 per cent of the weekly average for the coal year to date. The total shipments from the North Atlantic harbors and Hampton Roads for the coal year to date are estimated at 32,345,952 net tons, exceeding the requirements as originally outlined by the Fuel Administration by 2,780,976 net tons, or 9.4 per cent.

The production of beehive coke in the United States during the week ended Dec. 14 is estimated at 553,000 net tons, an increase of 10,000 net tons or approximately 2 per cent over the week preceding and a decrease of 21,000 net tons or approximately 4 per cent compared with the corresponding week of 1917. The daily average during the week of Dec. 14 is estimated at 92,000 net tons as against 96,000 net tons produced during the week of Dec. 14 of last year.

In the Connellsville, Greensburg and Latrobe districts of Pennsylvania production of beehive coke during the week of Dec. 14 amounted to 313,967 net tons. This production was brought about by the operation of the ovens at 70.2 per cent of full time as against 66.6 per cent during the week of Dec. 7, the improvement being attributed to better labor conditions. The same operators produced 180,900 net tons of coal during the current week as compared with 159,700 net tons of coal during the week of Dec. 7.

Byproduct coke production in the United States during the week ended Dec. 14, estimated at 578,871 net tons, while approximately the same as produced during the week preceding, exceeded the production of the corresponding week of 1917 by 150,000 net tons, or approximately 35 per cent.

The operation of the mine plants during the current week for the country as a whole was reported by the operators as 88.8 per cent of capacity. Out of a total loss of 11.2 per cent of full time, 5.5 per cent is attributed to repairs to plants, 2.1 per cent to lack of market and the balance to shortage of coal, labor troubles and other causes. Losses of full time on account of no market continued to exist in Massachusetts and Pennsylvania, the operators in these two states reporting approximately the same losses as during the week of Dec. 7. During the week, the supply of byproduct coal brought about improvement in operating conditions in New York and better labor conditions brought about increased production in Maryland.

## BUSINESS OPINIONS

**Marshall Field & Co.**—Current wholesale distribution of dry goods is still running about the same as for the corresponding week of 1917. Road sales for both immediate and future delivery were less than for the same week of last year. Customers were in the market in greater numbers. Retail business in holiday merchandise has been excellent. Collections continue good.

**American Wool and Cotton Reporter**—The increased estimate of the cotton crop was a surprise to many, but it was not considered of any particular importance in so far as prices are concerned. Very high prices for cotton undoubtedly will be noted eventually on the basis of supply and demand because even a single moderate American crop would not be large enough to solve the world's problem.

**Dry Goods Economist**—In textile circles the interest switched this week from cotton to wool. Two big auction sales were the attraction, one of woolen and worsted fabrics by a leading producer, the other of raw material. Bidding was spirited during the first three days. Prices were from 12 to 40 per cent. below those on the date the goods were opened for last fall, according to the desirability of the merchandise. In cotton circles there has been a softening of prices for print cloths to the extent of 3 per cent. No reductions have been made, however, in quotations for fine-yarn cotton fabrics.

**Bradstreet's**—Animation flowing from holiday buying sharply contrasts with the slow movements evidenced in wholesale lines, with the effects of cancellations, with downward revisions of some prices, and with uncertainty created either by the divergent views as to the future expressed by prominent personages or by concern over the fact that the government has large supplies of unused materials to market. Inventorying is under way, traveling salesmen are in for the holidays, small-lot filling orders conveyed by mail are the rule, and in cases where unexpectedly large stocks have been revealed, the policy is to clear decks. In fact the general attitude as to manufactured goods is to reduce prices in order to hasten readjustments and make a market.

**The Iron Age**—An open market for steel products has come in the past week, various forms of finished steel having sold at from \$4 to \$6 a ton below the Government maximum prices established for the fourth quarter of the year. Among pig-iron producers, those who have chafed under the fixing of pig-iron prices by steel makers now feel that as the demand for their product is relatively greater than that for finished steel they will be able to get the old prices. On the other hand, many foundries are well stocked with iron. But Southern furnaces have declined to take on 50,000 tons of basic iron for England, and Japan is inquiring for 20,000 tons. It is to be said that the reduced prices have brought out no large amount of new business. In the East a 6,000-ton plate contract was put through at 3c., the new figure, though some producers quoted the Government price. Now that the market is open, the possibility of further reductions is distinctly a factor.

## Atlantic Seaboard

## BOSTON

**Little change in situation. Almost no buying in any quarter.** Railroads send empties west in better volume. Coal movement east still further reduced and some railroads still trying to buy. Rumors of low prices for inferior coal, but nothing significant as to prices on quality grades. Scattering inquiries, but not so easy to get prompt shipment. Still hard to dispose of coal at destination. Large surplus of coal at Hampton Roads. Only restricted market over New York piers. Problem to furnish cargoes for barges and steamers in the trade. Anthracite looks easier. Rail movement about the same, but marked improvement looked for. "Storrow coal" reduced more than 50 per cent. Stove and chestnut still scarce. Difficulties over allotments and figures being cleared up gradually.

**Bituminous**—There are no marked indications of change in the general situation. The same disparity in cost between rail and water coal is much in evidence, and it can be said flatly that at the end of the calendar year there is no buying interest whatever. And beyond that there is no near prospect of any. Consumers will not make purchases until they have used the mongrel assortments now on hand, and when there is again anything like an

open market the trade is sure to meet with some very discriminating buying. Apparently there will be a lot of insistence upon quality and that will have a strong stabilizing influence as to price. Production now curtailed because of influenza and a disposition on the part of labor to take things easy is quite likely to be close-hauled for months to come, and there is small chance of coal being mined much faster than the market will absorb. This, together with the certainty that a lot of consumers ordinarily dependent upon water-borne coal will try to line up for shipments all-rail, will lead the trade to watch developments very closely the next few months. It will be interesting to see the situation unfold as the present heavy reserve stocks become gradually depleted.

Today there is a minimum of buying in every direction. The distribution inland of tidewater coal has dropped off nearly 75 per cent., and for Pocahontas and New River in cargo lots there is practically no sale whatever. Consignees having deliveries due on contract are suspending shipments because their stocks are so large and their consumption has decreased to such extent. This is true of a great number of plants. Cotton mills, for instance, are curtailing more and more rigidly as their goods pile up awaiting renewed buying. Other textiles and producers of many different staple lines are having the same experience.

One of the few recent developments is the demand for empty coal cars by railroads serving mines, particularly in the Pittsburgh region. Railroad executives here have been plied with urgent telegrams to return such empties promptly, and the fact that eastbound movement with coal has lately been so light makes such inquiry all the more pressing. A surplus of cars is reported as still the prevailing situation in central Pennsylvania, and certain of the railroads continue in arrears on their receipts of supply fuel. The Boston & Maine, for instance, is still making purchases at Government prices and has difficulty getting sufficient for current supply. The fact remains, however, that this road is among those with a heavy reserve; not as heavy as in some years, but sufficient for ordinary requirements.

All-rail movement through the five New England gateways continues to slump with the advancing season, although apparently this time the season has little to do with it. The average for six days, ending Dec. 18, was only slightly over 200 cars daily of commercial bituminous. The daily average for the first 16 days of December, railroad fuel included, was but 278 cars. Latterly, railroad fuel alone has averaged only 50 cars per day, as compared with the 150 cars that were the usual mark in September. This has a bearing on the efforts of certain of the roads to arrange for coal in the open market. Certain large groups of mines regularly furnishing these supplies have suffered severely from the influenza and other causes affecting labor.

Prices as low as \$2.20 have been quoted for inferior grades from Pennsylvania, but on investigation such offers appear to be based largely on expectation. It is questionable practice to exploit such proposals, for even low prices would not induce any substantial buying at this time, and they only add to the confused state in which the market finds itself at this juncture. Were the lower quotations followed far enough it would be found they applied to coal already mined, of doubtful character, and in the hands of people looking for ready money. On the quality coals there has been nothing a cent lower than the Government figure. Shippers of these grades have ample business for their present output, and notwithstanding their New England consignees are not taking their quota there is ample outlet for the coal in other directions, at least for the present. No significant change is noted in this respect, and it is quite possible there will be no considerable tonnage available for this market all-rail until buyers here are again ready to take on supply. Today there are only scattering inquiries, and while for these coal is readily found and for reasonably prompt shipment, yet it is plain that no comprehensive orders could be taken care of on anything like the same basis.

On the other hand, this territory is so plugged with coal in most directions that coal arriving at destination, undisposed of, is extremely hard to get rid of. Fuel authorities have had several cases on their hands lately where car service and re-forwarding charges have piled up to a large figure. In Connecticut recently it was even seriously urged that coal awaiting disposition should be sold by the railroad for the freight, but this, of course, was an extreme case. None the less it shows that some parts of New England are fairly glutted with coal.

**At Hampton Roads the excess of coal over bottoms reporting to load is mounting daily.** The tonnage dumped for commercial purposes is as constantly decreasing, and were it not for Government requisitions and bunker trade, together with export tonnage, there would be actual congestion at the piers with a record low movement of empties back to the fields. Agencies in this market are imploring their principals to send the coal west or along the line, anywhere but for New England disposition, and the few loadings coastwise show the extent to which these prayers have been answered. Water-borne coal on the basis of the current marine freights is extremely hard to sell.

Shippers generally are getting alive to the very large tonnage of barges and steamers available for the coastwise trade the coming year. The figures give some reason for alarm, for there seems small prospect now of placing all that tonnage from tidewater ports until buyers shall have had a season-long try to get their supplies all-rail. This will mean a slow-starting year, with all the buying interest most reluctant to tie itself to water-borne coal. There have been intimations that the Shipping Board would reduce coastwise freights, but apparently no move has yet been made nor will be made until it is demonstrated either that the colliers now in use are not suitable for other trades or there is less inquiry for steam tonnage in other directions. As it is, the Hampton Roads shippers, in particular, have reason for being disturbed over the outlook.

**Anthracite**—The fact that Government requisitions are gradually being reduced, that the Anthracite Committee is not making so many demands on behalf of alleged suffering communities, and the further fact that shipments all-rail the past week have taken a slight spurt, have all caused the trade to realize that anthracite conditions are really much easier. The continued mild weather has its great effect on current consumption, and many cases there are where the householder will not need that "last third" about which there was so much worry just a few short months ago. An increasing number of retailers in widely separated parts of New England have been reporting comfortable stocks for the present, and there have even been whispers of cancellations on the part of those who were most vehement in their denunciation of "independents" who were refusing to ship a few weeks ago. These shippers will of course feel the effect first of easier conditions and in this market, if the truth were known, there will not be many hands turned to help them when they have their surplus sizes to market during the coming months.

Rail receipts show a slight improvement. Through the five gateways the average movement of domestic sizes for the first 16 days of December was about the same as for the first week, although recent days have shown quite an improvement. It is likely that in another week the movement will reach 400 cars daily.

Instead of 100 cars per day the New England Fuel Administrator is now having shipped to his order but 46 cars, and it is understood this will shortly be further reduced, if not wiped out altogether. The opinion in the trade is very strong against further emergency shipments, for the effect they have on efforts in regular channels to move sizes in proportion as they are produced. The fuel authorities should never have been allowed to consult the fastidious preferences of certain retailers quick to raise the cry of "famine" when their stove coal is depleted.

Sundry difficulties over allotments and tonnage figures are gradually being straightened out, in most cases, however, because it is realized that regulation will be short-lived and shippers are more and more taking situations into their own hands. In some cases to wait for fuel authorities to act would mean serious inconvenience to communities where there are large populations.

## NEW YORK

**Anthracite situation looks brighter, but shortage of the domestic coals continues.** Demand for egg, stove and chestnut is strong, and consumers refuse to accept substitutes. Plenty of the smaller coals are available. Retail deliveries are almost at standstill. High-grade bituminous hard to buy at the mines and the demand at tide-water is slow. Cheap grades plentiful. Bunker demand heavy.

**Anthracite**—Conditions in this market have a brighter appearance. Reports indicate that more coal is coming here, but it does not include the sizes mostly in demand for household consumption. Weather

conditions have been in vast contrast to what they were a year ago, when those with good memories can recall that New York was in the grip of the bitterest winter it had ever had and the coal supply was down to rock bottom.

How much benefit New York City will receive now from the increased production reported from the coal fields remains to be seen. It has been learned that orders have been issued to producers and distributors that more than 350,000 tons of anthracite is to be sent to this tidewater during December and January for shipment to New England points. With this tonnage available it is believed New England will be provided for during the winter. Meantime New York dealers who are now, and have been, short of the needed domestic sizes for some weeks will have to continue to assure their customers that there will be plenty of coal available later on.

Producers report an improvement in conditions throughout the coal fields. Operations have been interrupted by new outbreaks of influenza, but the authorities believe it has about run its course. With the return to the mines of those who have been discharged from camps and from various of the war industries, operators expect the output this month will be close to normal. They point out that even with the lack of labor the output for eight months of the 1918-19 coal year shows a decrease of 1,139,712 tons as compared with the corresponding period of last year.

Dumpings at the local docks for the week ended Dec. 20 were 6381 cars as compared with 6098 cars the previous week.

Shippers are not able to take care of their customer's wants for egg, stove and chestnut coals. There is a good supply of broken, pea and No. 1 buckwheat. Rice and barley are free enough to cause salesmen, who have but recently started to visit dealers for the first time in nearly two years, some worry.

Retail yards are piled high with these two small sizes, but the dealers would be willing to increase these piles if they could be assured of a supply of the larger coals either now or in the near future. This promise the salesmen cannot make, and as a consequence rice and barley continue to be troublesome, although many houses are reported to be making concessions.

Retail dealers' business is practically at a standstill. Consumers who in most cases have been fortunate enough to secure two-thirds of their winter's supply are refusing the remaining one-third, rather than accept substitutes. As a result deliveries are slow and no improvement is expected until much of the coal now in the consumers' bins has been used.

The dealers have been presented with demands for increased wages by the drivers and engineers employed by them, but as yet no reply has been made by the employers. The dealers contend that if the increases are allowed it will mean that the price of coal will have to be advanced to the consumer.

**Bituminous**—The market is confusing. High-grade coals are practically unpurchasable at the mines and stray cargoes available here are almost unsalable. There is no demand. Consumers either have their bins filled or are existing on their reserve stocks until such time as they are forced to go into the market. In most cases they look for a break in prices as soon as the Government relinquishes its supervision.

The situation in the mining fields can be summed up in the words of an operator who has just returned from a visit to his properties, and who said he had found there was no demand for coal, production was held back by the "flu," and there were petty labor troubles. Others who have been in the coal fields report considerable uneasiness among the workers, who they say cannot get over the jealousy existing between them and their fellow union members in the hard coal fields, and who continue to believe they were discriminated against in the recent wage readjustment. Fear is expressed that this jealousy may yet lead to serious trouble and possibly strikes.

Local dumpings during the week ended Dec. 20 show that 6413 cars were handled at the tidewater docks as compared with 5250 cars the previous week.

Supplies of the cheaper grades of bituminous are plentiful, but not sufficient to cause a general shaving of prices, although it is reported some slight concessions have been made. As a rule buyers are not willing to take any of these grades unless they are compelled to do so to tide them over a possible shortage of the high-grade coals.

The final shipment of the so-called "Storow" coal for New England was made this week, and it is expected that the accounts will be closed within the next week or ten days.

Bunker demand continues to be strong with plenty of ships to take all available coals.

## PHILADELPHIA

**Anthracite**—The retail trade dull. Holding of egg and pea orders grows. Companies making better shipments of stove and nut. Consumers excess orders cause trouble. Dealers feeling better over situation. Suburbs in greatest need for fuel. Anxiety as to stocks on hand in spring. Flat retail price talked of. Bituminous trade lacks tone. Best coals scarce, but ordinary plentiful. Some price shading.

**Anthracite**—The retail business in this city is undeniably dull. There can be no doubt about it, and if coal were free there are many dealers who would be compelled to suspend shipments. As it is shippers report they are receiving numerous requests to hold up on egg and pea sizes.

Some of the smaller dealers are becoming anxious as to what they will do with their product, especially at their present prices, in the near future. It is not at all general as yet, but we hear of individual coal being offered to dealers far in excess of the amount purchased during the basic year of 1916-17, and in some cases where no coal is actually due them from the house offering it.

Local business in normal years is always poor around the holidays, and the unusually mild weather to date has had its effect; but no one looked for the slump this winter under any conditions. One representative retailer attributes the lack of eagerness on the part of the public to buy to the disappearance of all coal news from the front pages of the daily papers. While the papers were carrying "scareheads" everybody seemed to want coal, whether they needed it or not, but for the past few weeks, where the dealers know their customers have coal in their cellars they are afraid to deliver more, notwithstanding they hold unfilled orders. They fear it will be returned, and experience is teaching them to first notify the customer of the intended delivery.

One dealer reports having sent out sixty-five tons in one day, thirty of which were not accepted by the original consignee. The dealers are now becoming aware that the orders placed in the spring called for more coal than will be required by the householders. This means added expense to the dealers, for when the orders were filed with the fuel administrator they attached hundreds of stamps at 2c. per ton on these excess requirements, all of which is a total loss to the retailers. Efforts to collect this cost from the consumer almost invariably meets with disdain, so much so that few dealers are willing to ask for reimbursement.

It is now thought by some that the larger operators consented to increased allotments to various dealers as requested by the fuel authorities because they were all along satisfied that the whole situation was exaggerated. A number of dealers have admitted to us that they do not expect to sell before spring all the coal apportioned to them, and for which they made unusual efforts to get into stock in case of necessity, and should there be a still further increase in shipments to any great extent, some dealers will actually be compelled to hold their orders, especially in the absence of seasonal weather conditions.

Despite the fact that the consumers are pressing the dealers hard for stove and nut, the retailers themselves have lost much of the anxiety for coal that they possessed a few weeks since. Most of them now are fearful that they will be caught with a yard full of coal when spring comes, especially those handling the higher-priced individual coal, and with it the usual reduction in wholesale prices.

While egg and pea are rather plentiful there are many dealers short of stove and nut. Strange to say, the greatest scarcity appears to be in the suburbs, which is just the section of the city that it was proposed by the fuel authorities to care for early in the season. Mr. Lewis realizes the conditions under which coal is delivered in the outlying localities in bad weather, and he did all in his power to care for them first. No one will say why his wishes in the matter have not been fulfilled.

This week an advertisement appeared in the daily papers explaining the 75c. differential and why the dealers' prices are at variance. The advertisement bears the signature of the fuel administrator, but like others this season the space was contributed by the Philadelphia Coal Exchange and was inserted to "square" with the public the retailer who buys individual coal and is compelled to charge higher rates than those who handle either company coal exclusively or both company and individual.

At a meeting of the West Philadelphia dealers this week a movement was started that is causing much interest and is now being considered by the retail trade in other sections of the city. It is proposed to make

a flat retail price for all dealers. The idea seems to be to have the dealers who buy the cheaper coal raise their rates and the buyers of the higher priced coal lower theirs. Then in some way the dealers who advance their prices are to pool their excess profits in favor of those who reduce. Little has been said about the scheme, and while it is known that some dealers are unusually enthusiastic over the proposition the details are not yet obtainable.

The steam trade continues without any particular activity. It is true that all the heavy tonnage of buckwheat is being taken by the consumers, with the size at times becoming a little draggy, as we have heard of stray instances where individual shippers have offered an occasional car or so for domestic use. There continues to be plenty of rice and barley in the market and the big companies are unable to place all of their production, and some of the smaller shippers are compelled to store on the banks in the region.

The prices per gross ton c.o.d. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide	Line	Tide	
Broken	\$4.90	\$6.25	Buckwheat	\$3.40	\$4.45
Egg	4.80	6.15	Rice	2.90	3.80
Stove	5.05	6.40	Boiler	2.70	3.70
Nut	5.15	6.50	Barley	2.40	3.30
Pea	3.75	5.00	Culm	1.25	2.15

**Bituminous**—There is a lack of tone to the soft-coal trade. Outside of the high-volatile coals there is sufficient coal coming in to meet the needs of the market. Some of the larger producers of high-grade coals report curtailed production on account of a recurrence of influenza, together with short car supply. There is plenty of ordinary coal being offered, and we have reason to believe that quite a little tonnage is being sold below the fixed price. We know a specific instance where a cut of 50c. was offered. The softness of the market is shown by the number of letters being received by consumers from operators and brokers offering coal. At tide there also continues to be a dearth of the good grades for bunkering.

## BALTIMORE

Supply of all but best soft coals on market liberal, and purchasing comparatively light. First inclination toward price cutting seems overcome. Hard-coal supply at last flows in good shape. Small lot sale prices fixed.

**Bituminous**—As one after another the mines which formerly supplied this section are re-entering the open market to some extent, and as the Government holdings of soft coal are now almost entirely confined here to the best selected fuels, a selling condition more nearly approximating that before the war, with the exception of prices, is being established. The inflow of coal is now liberal, while the demand from business here is comparatively light. Most of the larger industries seem pretty well stocked, although some that were not on the preferential list in war time are now casting about to get better grade coals to mix with stocks they now have, or coals still running on contracts with mines that were accepted as emergency sources.

There is a feeling in the coal trade that there will be plenty of market for the more desirable coals, although more care in preparation will undoubtedly be forced on some operations that have been able to ship anything at all in the past and get the Government price. This feeling has apparently had a strong hand in stopping an early inclination to begin to shade the Government maximum. The past week, while supply was as liberal as the week previous, there was little talk of offerings for any coal really worth while below the Government figures. At tide here the Government was only holding on to Pool No. 9.

**Anthracite**—The hard-coal situation has become active for the dealers here through heavy arrivals during the past ten days. For the first time in months the equipment for delivery of the dealers was taxed. It was reported that some 900 cars of hard coal were received here in a week period. The best part of it is that a considerable part was of stove and nut sizes, which had been rare.

A number of dealers joined the class of a full delivery of the two-thirds program for their customers, and started on a new round-up on the remaining one-third for customers. The mild winter so far, and the incoming receipts, largely from one big concern that had been far back on proportionate shipping, has saved the situation here for hundreds of homes that had been without coal on Nov. 1.

The local fuel administration is gradually reducing forces and will probably pass in the main from active work some time in February. In the meantime it has just set

a price for small sales of bushel, peck and 16-lb. bags, which had remained constant for more than a year despite the increases in both wholesale and retail prices of ton lots. The new prices make an increase of 5c. on pea and nut coal on bushel sales and proportionately on smaller lots. The bag prices are advanced 1c. a bag of 16½ pounds.

## Lake Markets

### PITTSBURGH

**Market softened somewhat, but best grades remain at full prices. Production increased. No shortage of miners.**

The Pittsburgh district coal market has softened somewhat, but not nearly as much as Ohio markets as a whole, and the softening is confined to steam coal and the less desirable grades at that. Gas coal is very scarce and is difficult to buy even at the full Government limit of \$2.60 for 4-inch. Some producers are offering contracts for gas coal at the Government limit for a year and would be indisposed to sell at the price merely for a period that would carry the consumer over the winter.

Pittsburgh district operators insist that quality considered the Government price has been low relative to prices fixed for other districts, and that Pittsburgh coal is therefore worth the full limit price. They point out also that the season has been unprecedentedly mild and the fact that no very serious weakness has developed in the market is conclusive proof that there will be a very strong market the moment real winter weather develops.

The weekly production has crossed the million mark again, and last week probably amounted to fully 1,100,000 tons, against 1,055,000 tons produced the week before. A curious report that western Pennsylvania is experiencing a shortage of miners to the extent of 10,000 is flatly denied. Distribution of byproduct coal is now quite satisfactory, and the production manager has had practically no requests for additional supplies for ten days past.

Coal consumers who had accumulated stocks are now drawing upon them, but predictions are made that on the advent of bad weather this will cease, on account of the expense, and that the consumers will come into the market again.

There is no definite word as to when the Fuel Administration will relinquish its control of prices. All that is known is that the formerly expressed intention of removing control by about Dec. 15 has expired by limitation. While there is some softness in the market, the best grades of steam coal and all passable grades of gas coal are quotable at the full Government limits: Slack, \$2.10; mine-run, \$2.35; screened, \$2.60, per net ton at mine, Pittsburgh district. Brokers are now unable to obtain any brokerage from buyers, above the set figures, but can sometimes obtain a brokerage from the seller.

### TORONTO

**Anthracite coming forward freely. Dealers taking orders for small lots. Market overstocked with bituminous and prices unsettled.**

Coal shipments have been coming forward freely since the close of navigation and dealers are overtaking delayed deliveries. Orders are now being taken for all grades of anthracite in ton lots. The continued mildness of the weather has considerably relieved the situation, and as there is now plenty of labor to be had, it is believed that the crisis, which recently threatened to be serious, has been safely tided over. The market is still considerably overstocked with bituminous coal, for which the demand continues light, and is likely to remain so until the munition plants, now closed down, have been reorganized for other lines of industry. This has tended to unsettle prices, and sales in car lots are being made in some cases at from 25c to 50c per ton below the Government rate.

### BUFFALO

**Big surplus of bituminous. Anthracite increasing fast. If weather conditions last, coal will be plenty. Consumers of bituminous buying of operators direct.**

**Bituminous**—The market is becoming more inactive every day. Operators and jobbers are trying to work together in order to move the output promptly, but they are getting small support from the consumers, who see plenty of coal ahead and will hold off for a while. The holiday season, with its small output, may hold the market awhile, but it is not likely that anything will save it long unless the winter becomes severe. At the most there has

been a long period of mild weather, with only a small consumption, no matter what the rest of the winter may be.

The car situation is not good. A great number of empties are crowding into the yards here, and it is feared that certain branches of shipping will have to be shut off to enable the rest to move at all. There is complaint also of a shortage of men.

At the same time consumers as a rule are indifferent. Some of the jobbers are trying to tell them that it is a mistake to allow their supply to run down, even if there is a chance of breaking the market. A stoppage for want of coal would more than neutralize any advantage gained from a decline in the price.

**Anthracite**—The local situation is improving fast. Distributors report that they are getting more coal in a week than they did in all November. Retailers are working hard to keep up with the supply, and the best of it all is that the local fuel administration sees scarcely anyone asking for coal, in place of the long row of pleaders that was there a year ago. It is predicted that ten days or so of this sort of thing will make the whole situation quite easy, if it does not soon drive the fuel off easy, out of existence.

All this flow of coal here is due to the close of the lake trade, and it is supposed that the other all-rail points in this direction from the mines have been supplied in the same liberal manner as is the case with Buffalo. Natural gas is scant, but as a rule it is sufficient where it is allowed to be used. No increase of it is promised.

### CLEVELAND

**Stagnation in the steam coal and domestic market is having its complement in curtailed operations in the No. 8 district, where disaffection among the miners and their protestations that the wage scale question be now opened have become much more pronounced. Not in months has the local market been so stagnant. Many operators are fast approaching the point where they feel they should shade government prices if it will bring business to help offset high costs.**

**Bituminous**—Practically the last vestige of optimism has disappeared from the local steam-coal and domestic markets. The tonnage now moving into Cleveland and northern Ohio has shrunk almost to the zero point. Continued open weather has brought the retail trading down to a mere shadow of its normal self. With all war contracts in this district cancelled many large steam-coal users have shut down, while others have taken advantage of the lull to make repairs that war's exigencies compelled the postponement of for several years. Inventory time also has contributed its slowing up of business, and industrial prospects now appear the worst since the war's end.

As a result, No. 8 district mines are being closed daily and those that are being worked are only on half time. Restlessness among the miners over the end of the war and the question of higher wages has spread from the Pomeroy district to the No. 8. As yet no open demands have been made, but the men are making no efforts to conceal their belief that the signing of the armistice ended the war and that they are entitled to higher wages because of their efforts during the war. Operators claim that union officials are with them, and declare they will not consider wages at this time. No market and disgruntled labor combine to make eastern and southern Ohio's coal output not more than 40 per cent. of normal, if that much.

In the past week several small brokers have offered what they described as No. 8 mine-run at \$2.10 or 25c. below the maximum. It is believed that this is not standard No. 8 coal. The larger operators reaffirm their inability to make any concession at the present prices and their intention of closing down entirely if necessary. Seventy-five more days will see No. 8 coal moving toward the lower lake docks, they point out, and they can afford to bide their time. Stripping coal continues to flood the market, but there is no more demand for it at a marked concession than there is for the better grades.

The Pittsburgh Vein Operators' Association of Ohio reports that car service accorded its members in the week of Dec. 7 averaged 17.84 per cent. short. Lost production accordingly was 71,350 tons. Shipments in the week of Dec. 7 totaled 5213 cars, which compares with 5264 cars the first week preceding and 4742 the second.

**Anthracite**—Receipts are a trifle heavier, but not yet enough to make possible anything resembling a market. Demand has fallen off to rock bottom, and efforts to produce additional shipments have been abandoned.

### DETROIT

**With an over-plentiful supply of bituminous in many retail yards and in stock piles of steam plants, new business in Detroit is greatly curtailed.**

**Bituminous**—Complaints are still being made by Detroit jobbers and wholesalers that business is greatly restricted by the presence of unusually large stocks of bituminous coal in the reserve piles of the steam plants and in the yards of retail dealers. The inactive state of the market is to a considerable degree the result of unseasonably high temperatures.

Because of the weather, the market has lacked an important stimulating factor. Consumption has been of smaller volume both in the steam and domestic branches of the trade. Manufacturing plants which are numbered among the largest buyers of steam coal are in many cases holding reserves almost out of proportion to their needs, while a large number of the retailers have so much bituminous coal on hand that their yards afford no space for further stocks.

A plan to relieve the retail dealers by negotiating the sale of 25,000 tons or so of the excess stock to the City of Detroit has failed of realization. The Detroit common council, after considering the proposition made by the retailers, voted against its acceptance. This action doubtless was influenced by the fact that the city is now receiving all the coal it requires direct from the mines, and at a price from 25 to 35c. a ton cheaper than the retailers could afford to sell. The higher cost of the dealers' coal is accounted for by the 7 per cent. tax on freight charges and the extra expense involved in rehandling the coal now in their yards.

**Anthracite**—While little increase in receipts of anthracite is reported, the weather has made possible a substantial reduction in consumption, easing the pressure on dealers. The state fuel administration has announced modifications of earlier restrictions. Under the new rules all chestnut is reserved for baseburner users, other consumers are permitted to receive up to 50 per cent. of their fuel requirements of stove or egg sizes and all restrictions are removed from other sizes of anthracite, and from bituminous coal and coke. Considerable coke has been made available for domestic use by diversion from industrial plants that have been relieved of war contracts. Household consumers may now buy either gas or byproduct coke up to the full limit of their fuel requirements.

### COLUMBUS

**The coal trade in Ohio continues quiet to the extreme. There is little demand for either steam or domestic grades, and purchasers are paying a waiting game. Warm weather continues to hamper the retail business.**

Because of the prevalence of balmy weather, and also because of the fact that a large percentage of householders have stored their coal, there is little retail demand. It will require a cold spell to bring consumers in the market. Retailers have rather large stocks and are thus not disposed to buy until they have moved some of their surplus. Pocahontas is now coming into the local market and practically all dealers have taken on a small supply. Retail prices are being cut for the first time since the increase in prices several years ago. This is done in order to keep teams and trucks busy. The cut is not sufficient to demoralize the market and amounts to about 50 to 65c. on the ton. Rural dealers are expecting a fair trade shortly after the holidays as farmers have been too busy to haul their fuel supply.

The steam trade is absolutely quiet. Only a few scattering orders are received, and cancellations of standing orders are frequent. Consumers are loath to buy under present unsettled conditions, and they are using up their surplus stocks. Many consumers had stored fuel to last from three to five months. Manufacturing plants in non-war work are rather slow to resume operations, but it is expected that quite a few will start up after the first of the year. War plants are gradually shutting off and their fuel requirements are being reduced accordingly. Railroads are not taking any great amount, as the freight movement is somewhat reduced. Taking it all in all, the steam trade is the most quiet in years and operators as well as shippers believe it will continue slow for some time.

Production is being curtailed to a large degree by lack of orders. Then, again, the influenza epidemic is still prevalent and that is reducing the output in all fields. Lack of orders and cancellations are cutting into the amount mined, and it is estimated at about 35 to 45 per cent. in the Hocking Valley.

## CINCINNATI

Somewhat cooler weather has stimulated domestic demand, but steam market is still quiet, and production is ample for all departments.

The coldest weather of the season was experienced during the past week, but this did not mean anything much below freezing, and that only during the night. The days have remained very mild for so late in the winter, and the forced consumption of fuel, for heating purposes, remains at an astonishingly low level, everything considered. Domestic consumers in a few instances seem to have come into the market as a result of the mild cold snap, but for the most part the summer storage is taking care of the situation without difficulty.

Consumption up to this time has probably been the lightest of any winter season in years, and it seems reasonable to conclude that in all probability consumers who placed coal in storage will have very nearly enough to run them through the winter, unless January and February should bring some extremely cold weather. The quiet condition of various manufacturing lines is contributing, as for several weeks past, to a quiet market for steam fuel, and as the usual dullness of the holiday season is accentuated this year by the uncertainty and cancellation of orders resulting from the war, no improvement in the demand in this quarter can be expected soon. In short, the coal trade ate a good-sized slice of its cake in the summer, and that bids fair to be about all it will get, unless conditions both as to weather and industrial demand change very emphatically soon.

## LOUISVILLE

Market on better grades of coal slightly stronger, due to lower production. River coal feared by rail operators. Wagon mines on last legs. General demand for coal light.

Many large producing mines in the eastern as well as western Kentucky fields are beginning to close down for the holiday season, being short of orders, while miners are better fixed than usual, and anxious to lay aside work and take things easy after a strenuous production season. Some of the smaller mines are being forced to quit, or work on a two- or three-day basis for lack of business. Such mines as will operate throughout the month and early January expect to produce only about 40 per cent. of the usual tonnage. This lighter production is resulting in the market being a little firmer on good grades of coal, although some producers are absorbing the brokerage, and selling at 15c. a ton under Government prices.

At the present time the retail as well as steam demand is dull. Good domestic coals have not been cut in price to any extent, as stocks are not overly large, many retailers being stocked on low grades and endeavoring to cut these down before again entering the market. Low-grade domestic is hard to sell, and practically all grades of steam need a marketing organization of merit in order to get moved.

Producers in the eastern Kentucky sections handling coal into Louisville, Cincinnati and other river towns, are now feeling that river coal movement may be a menace to business, due to the fact that freight rates for rail coal are at least 25 per cent. higher than they were, whereas the river coal companies can transport coal at probably only 10c. a ton over former costs, as the increased cost will represent labor and barges only. Now that the West Virginia mines, and some in the Pittsburgh fields, are short of business, it is feared that a considerable quantity of river coal will come south on good boating stages.

Wagon mines are having a hard fight to maintain themselves, as they have no selling organizations; the jobbers and large consumers are not going to them for coal, and the poorer quality coal is not in much demand. Some of these mines have been reported to have cut prices as much as 50c. a ton in order to get business. However, many of them are closing down, and labor is drifting to the tipple mines.

The car supply has been generally good, although the distribution has not been what it should. Whereas long lines of empties are on sidings waiting demand at mines, some mines have been forced to lay off while awaiting deliveries of empties, especially on the lines of the Southern.

Railroads in Kentucky and neighboring states have been buying coal a little more freely, there being a fair demand for coal for railroad consumption. The Southern R.R. and the Louisville & Nashville have been buying engine coal in fair lots during the past few days.

## BIRMINGHAM

Active buying and scarcity of coal feature local trade conditions. Production improved to some extent but output not adequate to present needs.

There is little or no steam coal available for the spot trade. Contract consumers have been in the market the past week endeavoring to supplement the tonnage being received from regular shippers, who, for several weeks past, have been unable to supply the tonnage called for by contract buyers. On account of the shortage in supply, industries, public utilities, railroads and furnace companies are not making much headway in stocking for the holidays, but on the contrary have been forced in many instances to resort to stockpiles to meet current requirements.

No improvement is noted in the receipts of domestic coal, and the scarcity of this grade is more pronounced than in the case of steam fuel. It is a common sight to see yards which in normal times carried several thousand tons at all times, which are now perfectly bare.

Coal production for the week ending Dec. 7, showed an increase of about 60,000 net tons over the previous week, but a heavy decline in output is being anticipated around the holidays.

## Coke

## CONNELLSVILLE

Coke is scarce. Uncertain prospects as to continuance of price control. Holidays and bad weather promise curtailment in output.

Coke continues very scarce, furnace being hardly obtainable at all in the open market, while foundry coke is only in moderate supply and commands the Government limit except that many producers are willing to allow a brokerage to middlemen. Production of coke by byproduct ovens is approximately up to normal, the byproduct ovens being fairly well supplied with coal, and in many cases with coal of better grade than they were forced to use during the war. Connellsville coke production has increased a trifle, but is still between 50,000 and 75,000 tons a week below the rate of last September. Furnace requirements seem to be as heavy as ever, scarcely any furnaces having been blown out.

There is still nothing definite as to what the Fuel Administration will do in the matter of relinquishing control of prices. The program adopted seems to have been to close up the entire work by Dec. 31, but furnaces continue to importune the Fuel Administration to continue functioning, in view of the present scarcity of coke and the prospect that prices would advance if the control were taken off. The furnaces represent that in accordance with the general program of the steel trade prices are to be readjusted downward, and the steel producers have already accepted the reductions suggested for them; but as the blast furnaces have not reduced their pig-iron prices according to the suggestion, their claim for lower coke prices has correspondingly less standing.

Production of Connellsville coke in Christmas week is expected to show a great decrease, and winter weather, already long overdue, would effect a decrease of its own besides. It remains to be seen whether, in the event of removal of Government control and a tendency of the coke market to advance, furnaces would pay higher prices or would bank their stocks as a demonstration against the coke producers. The market remains quotable firm at the Government limits: Furnace, \$6; foundry, 72-hour selected, \$7; crushed, over 3-in., \$7.30; clean screenings over 3-in., \$5.50, per net ton at ovens.

The "Courier" reports coke production in the Connellsville and Lower Connellsville region in the week ended Dec. 14 at 283,865 tons, an increase of 11,215 tons, and raw coal shipments at 213,900 tons, an increase of 19,809 tons.

**Buffalo**—The scarcity reported lately continues, which means that labor is hard to get and the car situation is not of the best. The local byproduct plants are running at full capacity, and with fairly good coal supply it is likely that the beehive output will come back to normal in time to keep the furnaces running on good time. All ore by lake is now in, but the final figures have not been made up. The amount is considerably more than in any former season, at this port as well as generally. Fuel coke suffers from the slackness of soft coal, but sells well where competing with anthracite.

## Middle Western

## MILWAUKEE

Anthracite grades, except buckwheat, advanced 90c. per ton. Soft coal unchanged in price; supply abundant, but demand slow, owing to weather conditions.

Milwaukee coal dealers have been authorized by the fuel administration to advance anthracite grades, with the exception of buckwheat, 90c. per ton. The schedule now calls for \$12.77 for nut, \$12.68 for stove, \$12.46 for egg, \$11.30 for pea and \$10 for buckwheat. An extra charge of 50c. per ton is allowed when coal is carried in to bins. Coal received by rail is allowed a premium of over and above these rates.

The soft-coal market is dull, but prices have undergone no change. Hocking, Youghiogheny and Pittsburgh No. 6 sell for \$7.95, delivered, and splints and West Virginia egg and lump at \$8.45. Coke also commands the old price, \$12 per ton. Mild weather has checked the demand for soft coal.

The foregoing price schedule will probably hold throughout the winter, unless heavy snows should increase the cost of delivery, as was the case last season.

The closing days of the season of lake navigation were characterized by a heavy run of anthracite coal, receipts during the first 14 days of December exceeding in amount those of any full month during the entire season. When it became apparent that Milwaukee was liable to go into the winter minus her full quota of hard coal, State Fuel Administrator Fitzgerald and others hurried to Washington and secured an order for prompt shipment of the needed balance. Ten large cargoes of anthracite reached port during the last week of the season. December's receipts aggregated 126,417 tons of anthracite and 29,500 tons of bituminous, making the season's cargo receipts 802,265 tons of the former and 3,432,383 tons of the latter. This shows a loss, as against last year's record, of 120,273 tons of anthracite and a gain of 286,552 tons of bituminous.

The supply of anthracite will soon be exhausted, and unless additional consignments are permitted to come by rail, many consumers will be compelled to resort to soft coal before the winter is over.

Twenty-six emergency coal stations have been opened at as many points in Milwaukee by the County Council of Defense, where fuel will be supplied to the poor in quantities of from 50 to 300 lb., on the cash-and-carry plan. The rules of the Federal Fuel Administration will be strictly adhered to. Investigation developed the fact that small dealers who peddle coal in bushel lots were getting about \$20 per ton for anthracite.

## General Statistics

## NORFOLK &amp; WESTERN

Following is a statement of the coal tonnage from mines on the Norfolk & Western and from other railroads, for the month of October, 1918:

From	Net Tons
Pocahontas field	1,523,691
Tug River district	307,430
Thacker district	222,125
Kenova district	61,535
Clinch Valley district	132,267
Other Norfolk and Western fields	9,552
Total Norfolk and Western fields	2,256,600
Williamson & Pond Creek R. R.	184,156
Tug River & Kentucky R. R.	54,978
All other railroads	86,836
<b>Grand Total</b>	<b>2,582,570</b>

## RECORD COAL SHIPMENTS ON LAKES

A record for soft coal shipments on the Great Lakes was set during the season which has just closed. The vessels of the Lakes loaded 28,153,317 tons. This is an increase of more than one million tons over 1917. Shipments from the different ports for the season, according to reports received by the Ore and Coal Exchange, are as follows:

Port	Tons
Toledo	10,074,787
Sandusky	2,389,150
Huron	2,094,324
Lorain	3,342,681
Cleveland	3,217,801
Fairport	271,148
Ashtabula	3,405,365
Coneaut	2,212,947
Erie	1,145,114
<b>Total</b>	<b>28,153,317</b>

